THE IRON TRADE REVIEW

A JOURNAL OF THE IRON, STEEL, MANUFACTURING AND TRANSPORTATION INTERESTS OF THE CENTRAL WEST.

VOLUME XXI. CLEVELAND, O., NOVEMBER 8, 1888. NUMBER 46.

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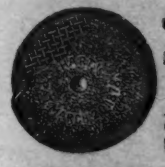

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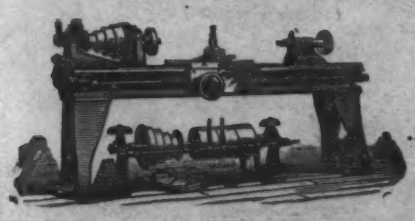

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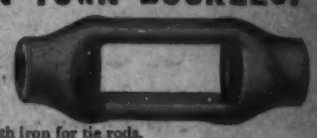

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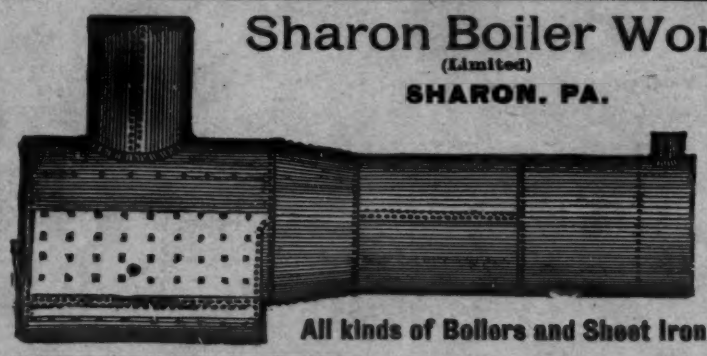

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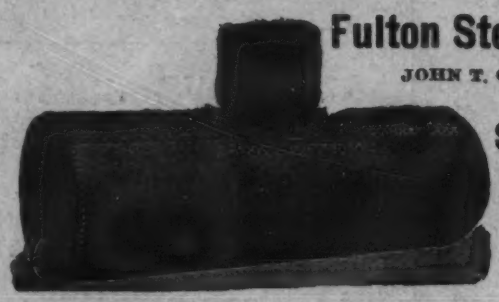

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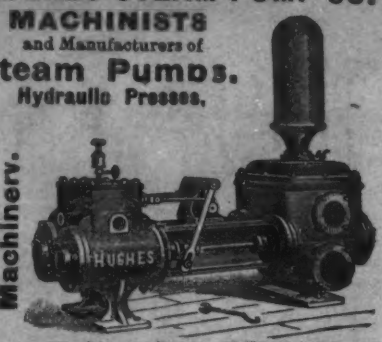

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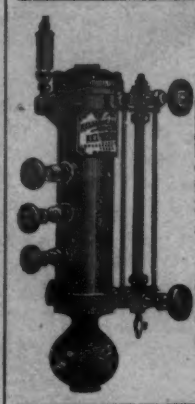

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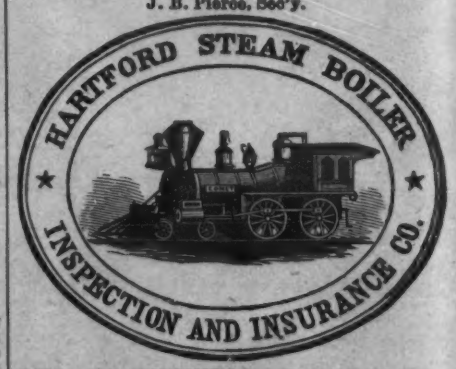

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VOLUME XXI. CLEVELAND, O., NOVEMBER 8, 1888. NUMBER 46.

HYDRAULIC PASSENGER ELEVATOR.

Noiseless running, starting and stopping easy and graceful; capable of running fast or slow, at the will of the operator, without any of the noise or the annoyances of the steam machine—these features have given the hydraulic passenger elevator the monopoly of popular favor. We present on this page a view of one of the superior passenger elevators, manufactured by the well-known firm of L. S. Graves & Son, Rochester, N. Y., showing the position of the hydraulic engine in the basement and its connections. The situation, size, capacity etc., of the parts can be varied to suit the different requirements.

Special attention is invited to convenience, economy and mechanical advantages of the horizontal hydraulic engine, which for safety, durability, and low cost of maintaining, is claimed to have no equal in the verticle and no superior in any.

First—Its horizontal location in the basement, or sub-cellar, the lowest and least valuable part of the building, confines all of the working parts, with its drips and pipe connections, where it is least liable to freeze or cause any damage by accident.

Second—As the water pressure, or working power, is due to the height of the source of supply from the hydraulic engine, consequently the maximum pressure is secured and the greatest possible lifting capacity from the amount of water used is guaranteed.

Third—Room being a valuable consideration in expensive buildings, the advantage of the system over those with cylinders and working parts extending up the whole height of the hatchway, calling for about one-third larger opening for the same size elevator (or any equal space adjoining) must be apparent.

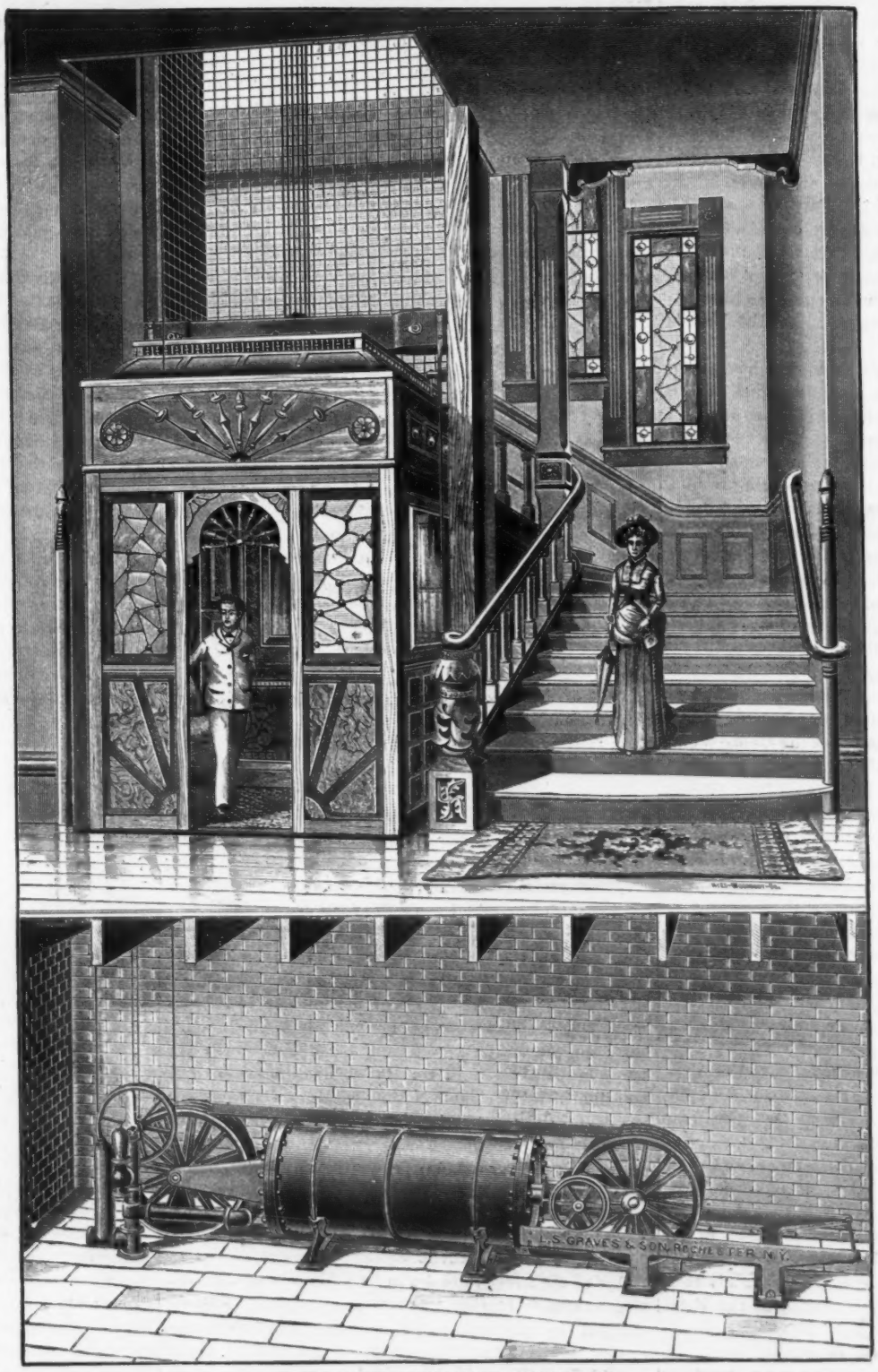
Fourth—The engine working noiselessly, and confined below, the disagreeable noise from the flowing and shutting off of the water, which is quite annoying in many prominent buildings fitted with upright machines, is entirely avoided.

Fifth—The horizontal construction enables the manufacturers to use very large engine sheaves (36 to 48 in. in diameter) not practical with the upright machine. This reduces the friction and doubles the wear of lifting cables.

Sixth—The lifting cables are continuous from their rigid fastenings at the cylinder to their connections with the car. There are no intermediate connections to break.

Seventh—Two heavy piston rods are used instead of one, as is usual with this class of machines. The whole force of the engine is to push, and cannot pull them apart.

Eighth—To avoid the possibility of accidents by breaking or bursting, the castings for cylinder, piston-head and cross-head are made extra heavy.



HYDRAULIC PASSENGER ELEVATOR.

THE longest tunnel in the world, it is believed, and which is now in a complete state, is that which drains the Schimnitz mines in Hungary. It is about ten and one-fourth miles in length, or about a mile longer than the St. Gothard, with a height of nine feet ten inches and a breadth of five feet three inches.

WHAT is said to be the largest railroad station in the world has recently been opened at Frankfort-on-the Main. It covers an area of 100,000 square feet, and cost 33,000,000 marks.

STORING HEAT IN FURNACE SHEETS.

National Car & Locomotive Builder.

The discussion at the last meeting of the Western Railway Club on "Circulation of Water in Locomotive Boilers," was one of the most interesting debates ever held by the club. Most engineers who have studied the subject, are convinced that better evaporative results would be obtained from the fuel burned in the fire-box of a locomotive if the body of water around the heating surfaces were greater and the circulation of the water was more active than it is. But existing arrangements are the result of a series of compromises induced by the teachings of experience, and any material structural change is likely to act injuriously in some direction. To increase the water spaces with a given size of boiler would lead to the contracting of the space necessary for combustion of the gases or of a reduction of the heating surface. The latter plan has been tried repeatedly and always brought failure.

We believe the proposal to increase the thickness of heating surface sheets to be based on a falacy that would prove very expensive if put into practice. The purpose of a sheet is not to act as a reservoir of heat, but to transmit the same to the water as rapidly as possible. If there was anything in the storage of heat idea, it would be carried out in fire-box sheets that had accumulated a lining of non-conducting lime scale. In that case the transfer of heat is known to be sluggish, and its practical effect is to crack and destroy the heating surface. Many experiments have been made to discover the effect on evaporation of water with heat transmitted through sheets of different thicknesses, and with sheets made of material having different degrees of conductivity. The good conductor and the thin sheet gave the best results every time. The men who have charge of locomotive boilers using feed water impregnated with lime, ought to have no difficulty in understanding what the practical effect would be of trying to make their fire-box sheets a storage for heat. Any Western man who cares to try side sheets of half inch steel, will soon find out things which will prevent him from repeating the experiment.

THE first patent ever issued in America was given to Samuel Hopkins, of Philadelphia, in 1790, for an improvement in the manufacture of potash.

A CHIHUAHUA, Mexico, correspondent states that good coke costs there $12.50 U. S. currency, coal $9.50, and bar iron sells for 7 to 8 cents per pound.

"PROTECTION AND PIG IRON."

The Detroit *Free Press* of recent date published, with startling headlines, a letter from Mr. E. S. Noble, Secretary of the Elk Rapids (Mich.) Iron Co., attacking the system of protection, especially on iron. The points by which he urges to prove that "protection is a hindrance and not a help" are: 1. "It has induced parties to build expensive works in the worst locations." 2. As proof he states that out of a "total of 716 furnaces 104 have been abandoned in the past five years." 3. That "at last tariff is powerless to protect." 4. That "he does not write from the standpoint of one who *has been hurt by the evils which he endures* under the system that once gave him large profits." 5. That his company makes iron at a profit, and has this year shipped 600 tons to England. 6. That the question of tariff has nothing to do with wages. 7. That if there are more men unemployed than he wants, he would get them cheap. 8. That with substantial reduction and "free raw material we could make iron for the world." 9. That "only the Almighty could determine a question so complex" as the proper duty to put on iron.

To this broad arraignment Mr. V. K. Moore makes reply in the Detroit *Tribune*, saying among other things:

Let us look at the facts. His [Noble's] connection with an iron company would naturally give weight to his utterances, but we find from the records that Mr. E. S. Noble, although secretary, is one of the smallest stockholders in it; that the president and largest stockholders are F. H. Head and N. K. Fairbanks, of Chicago; who together own 16,072 shares out of a total of 24,000 shares. I have positive information that Mr. Head and Mr. Fairbanks are both *strong protectionists*, hence Mr. Noble's letter must be accepted as his individual opinion, and not the opinion of the Elk Rapids Iron Co.

He states that 104 furnaces out of 716 have been abandoned in the last five years, and attributes that to the evils of protection. Mr. Noble knows that never in the history of the iron business have there been such strides made in improving methods, machinery and furnace practice as since 1880—revolutionizing results, increasing a capacity of fifteen or twenty tons daily under old methods to fifty and seventy-five tons daily in charcoal furnaces, and to 100 and 200 tons daily, and even more, in some that use coke. In this progress 104 furnaces have either exhausted their *fuel* supply, or have become antiquated and worn out, no longer able to compete with those so splendidly equipped with all modern appliances. They have been abandoned, not from the "evil effects of protection," but from other and natural causes. The very furnace of which he writes would have become obsolete had not the Chicago end of his company poured money like water into improvements of that plant, increasing its capacity from twenty or twenty-five tons a day to seventy-five tons now. It has had a most able management, an abundant and cheap wood supply, a fine sawmill connected with it of large capacity that has been very profitable, and with the liberal outlay for improvements, and with the building of the largest chemical works in the country, which saves and makes profitable the smoke and waste gases (usually lost) from which they make large quantities of wood alcohol and acetate of lime, it has been able to keep pace with other like enterprises, more desirably located, and has made money.

Next Mr. Noble says: "At last the tariff is powerless to protect, and his company is able and has sold 600 ons to England this year, and got a better price than here." This being true, the tariff does *not hurt him*, but other iron makers don't find a market abroad, and even Mr. Noble admits to only 600 tons, out of a total production of over 23,000 tons a year. But what about this sale to England? Mr. F. H. Head, the president of the company, is also at the head of the largest malleable iron works in the West—at Chicago—and is intimately connected with others at Cleveland, Buffalo, and the East, to whom he sells iron. A party of English tourists, friends of Mr. Head, interested in similar works in England, visiting Chicago, admitted, in discussing iron matters, the superiority of the castings of the Chicago Malleable Iron Works. Seeking the cause, and to test the question of the superiority of Michigan ores and charcoal fuel, they gave Mr. Head an experimental order for 600 tons last year, paying current prices. The superiority of the iron was so marked, that it seems they have repeated the order, although they could have bought English iron for less than half the price this cost them. It is the only sale of this or any other kind of iron to England that has been reported.

Now what does all this prove? If it proves anything it is simply the fact that charcoal pig iron, made from Michigan ores, is superior to English iron, or any other, for making fine malleable castings, and nothing more.

Then Mr. Noble says: "The question of tariff has nothing to do with labor. If I want 200 men and find 400 sitting around, I will get them *cheap*." Granted: but *because* of the numerous industries which have grown up under protection, the 400 are *not* "sitting around" waiting for him to pick out his 200 *cheap*. They are so well employed elsewhere at good wages that he has to pay those he gets $1.25 to $2 per day instead of 50 cents or a dollar, at which he wants them, and thinks he would get them, with the tariff removed. And that is where tariff helps wages—it keeps our laborers employed, instead of "sitting around" waiting for a job, as would be the case when increased importations had thrown them out of work.

In this matter I radically differ from Mr. Noble, for, as a manufacturer, I believe that, with a good market price for labor and good wages, the laborers will do better for their employers as well as for themselves, be better educated and more contented. If men were as plenty here and would work for the wages paid abroad, we could make iron for $10 a ton, *but will they? Is it for the best interests of the community they should?* Would Dexter & Noble sell as many goods from their immense store, which is an important adjunct to the business, or know that their workman were as comfortable or well off as they are to-day? The effect would be a *few* rich men, and the masses as miserable and degraded as those abroad, and a *standing army* would be required to keep them in order, here as there.

And then he wants "free raw material to enable him to sell iron to the world." The only raw material he could import for use would be foreign ores, mined abroad by labor paid 30 to 50 cents a day, to replace Michigan ores for which our laborers are paid $2.25 and $2.50 a day for mining. With heavy foreign importations the furnaces to smelt that ore would be at the seaboard and not at Elk Rapids.

Lastly, I quote his words: "Think of the mortal man assuming to say whether $6.72 or any other sum, is a just tax and proper quantity to lay on pig iron. Only the Almighty could determine a question so complex, and yet puny legislators, with diminutive intellects, assume to say how many dollars and cents shall be the just measure to exact of 60,000,000 of people, to enable less than one hundred and fifteen thousand to engage successfully in making iron;" and, he adds: "If I had the absolute power to-day, I would *fix the tariff where it is now*, and then reduce it 5 per cent. each year for 20 years."

First, admitting the "Almighty alone can determine a question so complex," then *he* would "fix the tariff where it now is," at $6.72, though this amount was placed on iron "by puny legislators with diminutive intellects," as a proper duty. As a political economist, Mr. Noble concludes that protection to pig iron is, and has been, "an evil." In this the facts are against him. The experience of our entire Northern section is against him. The experience of his own company, which he admits, has grown rich under protection, is against him. His president and the owners of more than two-thirds of the stock of his company are radically opposed to his ideas on the subject. The 115,000 iron works for whom he seeks to speak are almost unanimous in disagreeing with him. Our National history disproves his theory, for the record shows, first, there has never been a protective tariff in this country that did not bring prosperity, and second, our protective tariff has never been assailed or broken down without bringing adversity with it.

Cost of Electric Street Railways.

One of the street railways in New York is about running its cars to Harlem by an electric motor. Experts engaged in perfecting the scheme have made an exhibit, showing that it can be done at a cost of about two-thirds of the amount required to run over the same route with horses or cable. There will be 16 batteries, inclosed in one wagon, which will furnish sufficient power for two round trips. Sixty electric street railways are now in operation in the United States. Of their ultimate success there can be but little doubt; the only question of any special importance upon which the experts differ is the superiority of any particular system.

THE NEW COKE SYNDICATE.

Connellsville (Pa.) Courier.

The new Coke Producers' Association is an accomplished fact. The individual members held another meeting at this place on Wednesday. Owing to some misunderstanding as to the time of the meeting, several operators were absent, and a few others who did understand were unable to be present. There was, however, a goodly attendance, and those present signed the association papers. Assurances were received by telegraph from most of those absent that they were in hearty accord with the movement, and would sign the papers at the next meeting. Several members asked to have the documents forwarded to them at once for signature. The meeting convened at the Youth House, when the agreements which had been prepared by a committee appointed at the Uniontown meeting last week were submitted, approved and signed.

The association agreement sets forth that the members, for their common and individual interests, agree to co-operate under the title of the Connellsville Coke Producers' Association: 1st, For the purpose of maintaining a profitable price for coke; 2d, For equitable restriction of product when necessary; 3d, To secure, as far as possible, a pro rata distribution of cars to each firm. The officers are to consist of a President, Secretary and Treasurer, and regular meetings are to be held quarterly. An Executive Committee is also to be elected, to whom will be referred all questions of price, transportation, contracts, complaints of car shortage, etc. J. W. Moore & Co. are made the sales agents of the Association, with headquarters at Pittsburgh, and they are to account through the Executive Committee, and are to be guided by the latter in making monthly prices.

In the individual agreement, made separately by J. W. Moore & Co., with each firm in the Association, it is agreed that the former is to undertake the sale of the latter's coke, guaranteeing payment monthly at the price agreed upon by the Executive Committee of the Association, and for this they are to receive as compensation the sum of five cents per ton. It is specially agreed that the output from each works shall be pro rata. Averages are to be maintained monthly, and shipments equalized at least every two months. J. W. Moore & Co. are to forthwith open and maintain a shipping office at Everson, and to give each member, as far as possible, a full run of cars and supply destinations for them. The contract takes effect November 1st, and continues in force one year, with the understanding that a sale of the works of either party, upon 30 days' notice, terminates the agreement.

The Association meets again to-morrow, when it is expected all the agreements will be signed, the officers elected and business commenced. The Association contemplates the following firms and works:

WORKS.	OWNERS.	OVENS.
Mammoth	J. W. Moore & Co.	509
Anchor	P. M. M. & S. Co.	100
Clinton	B. F. Keister & Co.	50
Cora	J. Newmyer & Son	42
Calumet	Calumet Coke Co	215
Clarissa	James Cochran Sons & Co.	108
Dexter	J. R. Stauffer & Co.	40
Fairchance	Fairchance Furnace Co.	90
Fayette	Fayette Coke & Furnace Co.	130
Franklin	B. F. Keister & Co	44
Hecla	Hecla Coke Co	272
Home	Stauffer & Wiley	20
Jackson	James Cochran & Sons	64
Kyle	Bliss & Marshall	127
Lemont	Robert Hogsett	134
Mt. Braddock	do	132
Mutual	Mutual M. & M. Co.	140
Nellie	Brown & Cochran	254
Overton	A. C. Overholt & Co.	110
Parrish	Dunbar Furnace Co	70
Pennsville	Pennsville Coke Co.	92
Percy	Percy Mining Co.	62
Uniondale	Reid Bros.	76
Wynn	Wynn Coke Mining Co.	70
Youngstown	Youngstown Coke Co.	240
Total ovens		3,191

This includes all the firms outside of the H. C. Frick Coke Co., the Connellsville Coke & Iron Co., the McClure Coke Co., the Schoonmaker Coke Co., and W. J. Rainy & Co., save the following: A. C. Cochran, Buckeye Works, 160 ovens; J. W. Overholt & Co., Emma, 13 ovens; Isaac Taylor, Great Bluff, 16 ovens; total, 212 ovens. Cochran is sold ahead for a year, or he would enter the combine. It is not certain whether Nellie and Mutual will go in or not. The former is sold ahead and ships by river; the latter has not been heard from. The Calumet works are but half completed, and 80 ovens at Fairchance and Fayette supply coke to the furnaces there, but taking all these things in to consideration, the Association represents at least 2,600 ovens whose product will enter at once upon the market, provided, of course, all those sign on Saturday who are expected to do so, of which there does not seem to be any doubt.

NEW STEAM DROP PRESS.

The cut illustrates a drop press recently built by E. W. Bliss Co., of Brooklyn, N. Y., for heavy stamping purposes, and has some novel features. The requirements of the case for which it was designed called for a hammer, which, together with the soft metal force to be attached, should weigh 6,000 pounds, and that a clear space of 48″ between guides should be had.

The excessive weight to be lifted rendered the use of any of the mechanical appliances ordinarily used for the purpose of catching the rebound and lifting the hammer too uncertain and too easily subject to derangement from constant shock to be considered available, and recourse was had to direct steam pressure. The cylinder at top is 16″ bore, by 24″ effective stroke, and is single acting.

Steam is admitted at the lower end for lifting the hammer, but none is admitted on top of the piston, except back pressure from the exhaust for the purpose of cushioning, as will be explained. The piston and piston-rod are forged from a single steel billet, and the lower end of the rod, which is 7″ diameter, is turned slightly taper and keyed into the forged iron hammer head. The piston has two grooves turned in it, in which are inserted four tool steel packing rings, as rings made of any other material would not stand the jar to which they are subjected.

The piston, piston-rod and hammer weigh together 3,000 pounds, and in operation an additional weight of 3,000 pounds of soft metal may be attached. The port at upper end of the cylinder enters the latter four inches below the head, leaving this amount of space for cushioning on the up-stroke.

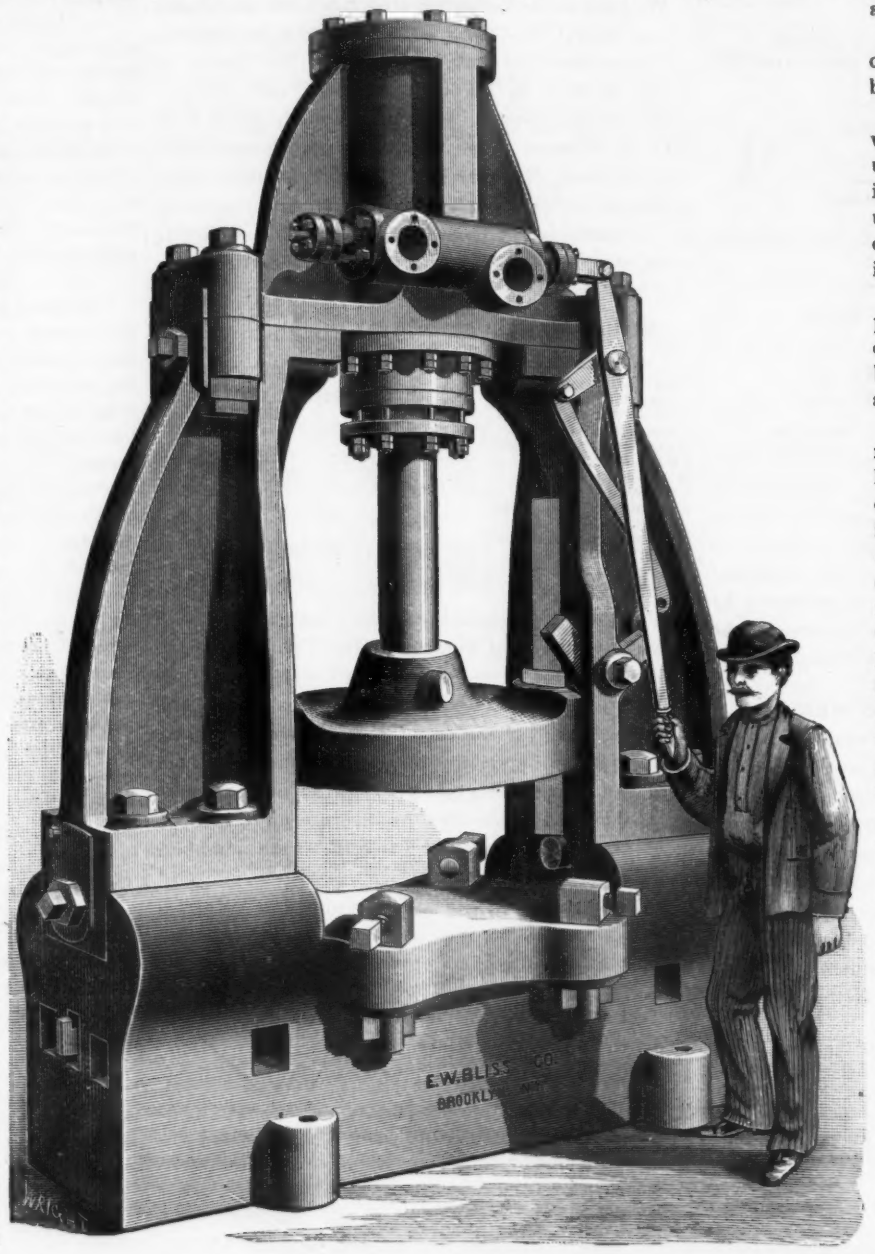
As the machine is operated with 100 pounds of steam, giving an upward effective or net impulse on the piston of something over 10,000 pounds, (necessary to free hammer from die), it was thought necessary to provide additional security against striking the head, especially as when the rings became a little leaky, (and in this class of machinery it is impossible to keep it absolutely tight), the cushion pressure would be lost, to some extent.

To accomplish this the valve, which is of the piston type, and fitted with tool steel packing rings, is so arranged that when steam is admitted to lift the piston, the upper end of the cylinder is open to the exhaust through a port opening of only 1-1,000th of the area of the piston. This creates a back pressure on the up-stroke which, when the piston reaches the point of passing the port, amounts to about 80 per cent. of the initial steam pressure.

By this back-pressure not only is the piston greatly retarded in its upward stroke, but when cushioning occurs, it commences upon nearly full steam pressure, instead of upon atmospheric and a leak would need be very serious, and the upward tendency of the piston very persistent to neutralize this powerful persuader against further motion.

When the valve is reversed, so as to exhaust the steam below and allow the hammer to fall freely, the upper port is open its full area and the back-pressure from the escaping steam enters the upper end of the cylinder. The housings, which carry the cylinder and furnish a guide for the hammer, are secured to the bed by four bolts passing down through the bed to pockets in which are the nuts, kept from jarring loose by rubber washers. The screws, by means of which they are adjusted laterally, to compensate for wear on the hammer, pass through wrought iron poppets, let into the bed in the same manner as the four poppet screws shown in cut for holding the die. The cylinder is secured to the housings in a similar manner.

In order to prevent the hammer from descending when steam is turned of, a latch is provided in the right hand housing, as shown, which is so connected with the hand lever which operates the valve, as to be moved out of the way when the hammer is allowed to fall. When steam is on no such support is necessary. The other general details are extreme width of bed, 7½ feet; weight of bed, 25,000 pounds; width between housings, 48″; extreme height, 12 feet. Total weight, 45,000 pounds.



NEW STEAM DROP PRESS.

Our Railroads in 1890.

It is doubtful if there could be selected a better means of studying the wonderful growth of this country within recent years, than by an examination of the statistics presented in "Poor's Manual of Railroads" for 1888. As an example of this, it may be stated that at the end of 1887 there were in the country 149,913 miles of railroad, an increase during a period of seven years of 56,564 miles, the rate of increase being more than sixty per cent. From 1830 to 1840 there were built 2,814 miles; from 1840 to 1850 there were built 6,203 miles; from 1850 to 1860 there were built 22,279 miles; from 1870 to 1880 there were built 40,435 miles, while, as shown above there have been built, in the last seven years, 56,564 miles; probable mileage in 1890, at same ratio, 175,000.

Viewed in the light of our present knowledge, the statement made by Henry V. Poor, in his "Manual" for 1880, that "the 100,000 miles of to-day will in ten years be 200,000; the investment of $6,000,000,000 to-day will in ten years equal $10,000,000,000," does not seem to be nearly so extravagant, as some people thought it was when it was written.

The total mileage of railroads constructed in 1887 exceeded 13,000 miles—a greater total, by some 1,100 miles, than the mileage constructed in any previous year. Should the construction of the next three years average an equal amount, the total at the end of 1890 will be about 190,000 miles. In any case, it is safe to say the figures will reach 175,000 miles, or only about 12½ per cent. less than the estimate made. With an average increase of 10,000 miles per annum, during the decade ending with 1900, we will have, at the opening of the 20th century, a total mileage of close on 300,000 miles.

GOOD NEWS FOR INVENTORS.

Farm Machinery.

It now looks as though the Court of Patent Appeals is about to become an establishment of our Government. Such an institution has long been a crying need, because of expensive and irritating delays in the establishing of inventors' titles to their property. The proposition is that the court shall consist of one Chief Justice and two Associate Justices, to be appointed by the President, by and with the advice and consent of the Senate, and who shall receive a salary of $6,000 per annum, and hold office during good behavior. The House Judiciary Committee has reported in favor of the bill. The following are given among the advantages which may reasonably be expected to result from the establishment of the court:

1. It would enable the public and patentees to determine the value and validity of patents without serious and vexatious delays, and thus promote the interests of all concerned.

2. It will relieve the Supreme Court of much of the burden imposed upon it by this class of litigation.

3. The practice in the Patent Office would become thoroughly fixed and understood, and, as a consequence, the issue of worthless patents, in which unscrupulous persons deal, to the injury of the public, would be greatly diminished, if not entirely suppressed.

4. It would tend to simplifying the patent laws by constriction, and settling questions of doubt which are often used by litigants for the purpose of injustice and oppression.

Under the present law an inventor's right to his property in a patent is limited to a few years, and it often occurs that a great portion of that time is consumed in litigation and in delays caused by present courts being overcrowded. It generally requires three to four years for an inventor to ascertain what his rights are under a patent. Not only is this an injustice to the inventor, but important operations, which it is to the interest of the community to have pushed forward rapidly are often delayed, and their benefits in some cases permanently abridged. A special court for the decision of such cases will become of inestimable value to inventors and manufacturers, more especially as the judges composing it would devote their entire time to patent cases, and hence would become more familiar with the mechanical and scientific knowledge required for such cases in addition to legal learning. We believe the time will come when our inventors will have legal relief from the many multiplied embarrassments under which they now labor.

Shipping Bounties.

Marine Journal.

England has steadily adhered to the policy of aiding her merchant ships for more than a hundred years. She has given them over $275,000,000 and has aided her private yards to the amount of $100,000,000. No American industry ever received such protection from our laws as she has given her ships. One would think that, considering exceptional natural advantages, her "infant" goslings might by this time have learned to swim alone, but she finds that what is good to get trade is good to keep it, and no investments ever paid her better than the bounties which have run out American ships and given her control of the vast carrying trade of both North and South America. In fact, it has been the United States and not Great Britain who has paid these bounties.

BUILDING blocks made of corncobs form the object of a new Italian patent. The cobs are pressed by machinery into forms similar to bricks and held together by wire. They are made water tight by soaking with tar. These molds are very hard and strong. Their weight is less than one-third of that of a hollow brick, and they can never get damp.

THE
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IRON AND STEEL INDUSTRY, THE MACHINERY TRADE AND KINDRED INTERESTS.

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OUR SUPPLEMENT.

With this issue of the IRON TRADE REVIEW we send out a lithographed supplement showing the works of the Oregon Iron and Steel Company. Comparatively little is known in the East regarding the iron industry of the Pacific Coast, and the recent establishment of extensive works in Washington Territory by the Mossbay Iron and Steel Co., an English corporation, has awakened many inquiries. These will, in part, be answered by matter in our supplement, which speaks volumes for the enterprise of the Oregon Iron and Steel Company.

LECTURES TO BUSINESS MEN.

We take pleasure in announcing the establishment of a course of "University Lectures," in Cleveland, on the general plan of the "University Extension Lectures," in England, which annually reach 300,000 business and working men in the various trade centers of that country. This scheme has got a footing in the United States, radiating from the Johns Hopkins University, and the Cleveland business public is indebted for their repetition here to Dr. Hiram C. Haydn, President of Western Reserve University. The subjects to be discussed are as follows:

1. Labor Legislation.
2. Wages.
3. Labor Organization.
4. Co-Operation and Profit Sharing.
5. Taxation.
6 and 7. Socialism and Anarchy, with the Causes of Discontent.
8. Henry George and the Land Question.
9. Immigration and Problems Connected Therewith.
10. Education—State and Industrial.

These lectures will be given, the first five by Prof. Edward W. Beemis, of Vanderbilt University; the second five by Prof. Edward G. Bourne, the new Professor in History, at Adelbert College.

INDUSTRIAL PARADES.

Politics aside, industrial parades serve a good object in one respect at least: in that they present a living, tangible picture of our manufacturing interests in a way that is at once striking, suggestive and educational. Thus the recent displays in New York, Cleveland, Indianapolis, Akron and elsewhere gave many people an idea as to the extent and diversified character of their respective industrial establishments, such as they could get by no other method. Figures, indeed, are convincing, but the parade is an object lesson, the force of which no one can escape.

Speaking for the local display, which occurred on Saturday afternoon, November 3, it was conceded on all hands as far eclipsing anything of the kind ever before witnessed in Northern Ohio. The shipbuilding interests were represented by steam and sailing vessels, cordage, blocks, etc.; the iron and steel establishments sent rolls, forges, pig iron, steel rails piled in the form of a log cabin, and various other products of the mills; the machine shops and foundries displayed huge patterns of pulleys, flywheels, castings, etc.; the agricultural implement factories attracted general attention; the safe companies made handsome exhibits of safe and vault work; and the wire works, tinware establishments, paint and varnish companies, printing establishments, and a host of other industries were very creditably represented, the line being estimated as at least ten miles in length. Admiring thousands stood for hours watching the passing panorama, and it is safe to say that scarcely in a generation is such an opportunity given to witness and appreciate the value and importance of our industrial system.

THE CENTRAL WEST AS A MARKET.

We have heretofore called attention to the importance of the Central West as a machinery market, but the facts will bear repetition since, as we believe, no district of equal territory in the United States can compare with it in this respect. If we draw a circle which shall take in Western New York, Western Pennsylvania, Ohio, Indiana, Michigan and Kentucky, it will be found to include not far from 25,000 establishments constantly in the market for purchases of this kind. The following table, compiled from actual lists of names, invites study:

Establishments.	Western N. Y.	Western Pa.	Ohio.	Ind.	Mich.	W. Va.	Ky.	Total.
Blast furnaces and rolling mills	6	146	145	10	12	15	14	348
Metal-working establishments	389	325	839	258	467	53	95	2,377
Wood-working establishments	800	750	1,080	978	1,177	129	226	5,140
Steam-users	710	625	1,709	675	600	114	446	4,899
Hardware concerns	1,110	1,120	1,806	1,062	1,006	163	462	6,729
Agricultural implement manufacturers	85	60	152	78	76	2	16	469
Plumbers, gas and steam fitters	410	260	223	52	77	9	41	1,072
Total	3 461	3,286	5,954	3,113	3,415	485	1,320	21,034

Comparing the several branches of industry, reported above, with the total number in the United States, it appears that the territory described contains 33 per cent. of the blast furnaces and rolling mills of the country; 27 per cent. of the metal-working establishments; 29 per cent. of the wood-working establishments; 31 per cent. of the steam-users; 24 per cent. of the hardware establishments; 28 per cent. of the agricultural implement manufactories, and 24 per cent. of the plumbers and gas and steam fitters.

As the special exponent of this important industrial center, the IRON TRADE REVIEW experiences a just pride in calling attention to these facts.

A LONESOME IRON MANUFACTURER.

Mr. E. S. Noble, Secretary of the Elk Rapids (Mich.) Iron Company, must feel a little lonesome, if we are to judge from his recent attack on the system of protection, which is neatly and effectively answered in another column. He, alone among American iron manufacturers, asserts his belief that "protection is a hindrance, not a help" to the country's prosperity, and that "the question of tariff has nothing to do with wages." If that doesn't lift him above and away from his associates in the iron business, North, South, East and West, in point of belief founded on practical experience and observation, we cannot conceive of a wider separation. We regret that the great mass of iron manufacturers of the country cannot follow Mr. Noble in his unique position, and we cannot but hope that further reflection and more accurate observation, coupled with some wholesome reading, may convince him that the writing of his article was hasty and ill-advised.

PIG IRON OVERPRODUCTION IN THE SOUTH.

Concerning the position assumed by the IRON TRADE REVIEW, that the industrial danger threatening the South was the neglect to build up establishments for the consumption of Southern pig iron, which otherwise will become a drug on the market, a South Carolina metallurgist of wide experience and recognized standing writes:

The danger you point out, viz.: overproduction of crude metal, is, to my thinking, rapidly approaching, while there is not so great an increase of iron-using manufactories as we could wish. I have been in Alabama twice within the last twelve months, at Tuscaloosa, Bessemer, Birmingham, Anniston, etc., and have talked with many prominent iron and coal men, and with men prominent in other lines of business. I have found there too general a tendency to consider Alabama as the great producer of cheap pig, as occupying a position so favorable as almost to exclude the possibility of successful competition; hence the multiplication of furnaces. I am reliably informed that by the 1st of January, 1889, there will be 21 furnaces in blast in the Birmingham district, to say nothing of Anniston, Gadsden, etc. Naturally there will come a time, and that soon, when the competition among these furnace men, situated as they are with great and unquestioned advantages, will be a "Kilkenny cat" affair. The main competition so far has been with Northern and Western furnaces of less favorable situation, and attractive figures of economical production have been given to the world. But when "Greek meets Greek," we will have a condition of things the reverse of pleasant to some folks. It will be too late then to provide the remedy; when men must sell they have to take what they can get. Your suggestion as to the proper remedy for what is certain to come coincide entirely with my own views, viz.: the building of rolling mills, stove works, pipe works, machine works, etc., now, instead of looking toward an increase of furnaces. There are enough furnaces there now to make the inevitable competition very lively indeed.

THE enterprise of *The Century* is simply boundless. Not content with its brilliant achievements of the past year, it announces features for 1889 which are, if possible, even more fascinating. Among other promises which it makes for the new year, is the most important art feature that has yet found place in its pages. It is the result of four years' work of Mr. Timothy Cole, the leading magazine engraver of the world, in the galleries of Europe, engraving from the originals the greatest pictures by the old masters. A series of papers on Ireland, its customs, landscapes, etc., will appear, and there are to be illustrated articles on Bible scenes, treating especially the subjects of the International Sunday-School Lessons. George W. Cable will write "Strange, True Stories of Louisiana." There will be novelettes and short stories by leading writers, occasional articles on war subjects (supplemental to the famous "War Papers" by General Grant and others, which have been appearing in *The Century*), etc., etc. *The Century* costs $4.00 a year, and it is published by The Century Co., of New York, who will send a copy of the full prospectus to any one on request.

AMONG the bright features of *Wide-Awake* for 1889 (D. Lathrop Company, publishers, Boston, Mass.), will be serial stories by J. T. Trowbridge, Margaret Sidney, Susan Coolidge and Charles R. Talbot; thrilling tales of the "Wild West," by Jessie Benton Fremont, "Children of the White House," by Mrs. Harriet Taylor Upton; any number of short stories by Elizabeth Stuart Phelps and others, articles by Gen. O. O. Howard, poems by Jean Ingelow, etc. Nothing more wholesome for the little folks.

A NEW way of annealing small pieces of steel is given by a writer in the English *Mechanic*. Heat the piece as slowly as possible, and when at a low red heat put it between two pieces of dry boards and screw them up tight in a vise. The steel burns its way into the boards, and, on coming together around it, they form a practically air-tight charcoal bed. When its cools off the steel is apt to be found thoroughly annealed.

A SEWING machine patented in 1760, or sixty years before Howe invented his machine, is now on view in the Sewing Machine and Domestic Appliances Exhibition, South Kensington. It is popularly supposed that Elias Howe was the pioneer in this field.

IMMIGRATION at New York during the 12 months ended June 30 was larger than ever before, excepting the years 1881, 1882 and 1883. The total was 550,000 persons, which is 60,000 in excess of the previous year, and there are no signs of a decrease in the future.

A SWEDISH engineer, M. Lundberg, says a foreign exchange, has constructed a railway car, which, in a few minutes, may be adapted to five different gauges, the narrowest being 0.890 m. The invention has been patented in several foreign countries.

THE LATE A. C. GETCHELL.

A. C. Getchell, the subject of this sketch, was a native of Maine, born at Waterville, March 8, 1824. His father died while he was a small boy, and at the age of 12 years he left his home, going to Boston. He shipped as cabin boy on board a merchant vessel, and sailed on a trading voyage around the world, visiting England, India, Japan, China and other points, making his way across the Pacific to the western coast of America. The vessel took out a cargo mostly of hides, and returned to Boston by the southern cape.

He then commenced the machinist trade in which he became an adept, and laid the foundation of his avocation or profession in after-life. Having completed his trade he went to the City of Bangor, Me., where he married in 1840, and soon thereafter he moved to Portland, and became mate on board a steamer plying between Portland and Boston. After being thus employed for a time, he made another change, and ran as engineer on the Atlantic & St. Lawrence Railroad. Upon the completion of his term of service in that capacity, he went into the machine shop of the same road to acquaint himself with the mechanism and the working of the locomotive.

In 1852 he came West in charge of locomotives for a Kentucky railroad, where he set them in running order. This being accomplished, he accepted the situation of master mechanic of a railroad running north from Cincinnati to Dayton, he locating at Eaton. The location not suiting his family, he moved to Cleveland in 1854, and secured the position of engineer on the Cleveland & Pittsburgh Railroad, where he ran for one year, and then went on to the Lake Shore & Michigan Central road, where he continued through 1855, 1856 and 1857. He then turned his attention to running stationary engines, and took charge of the engines and boilers of the National and Cleveland Milling Co.'s flour mills, where he continued for several years, during which time he was employed as deputy boiler inspector of the Cleveland district, under the State inspection law. His appointment dated from May 20, 1869, and he served in the office until the law was repealed.

The Hartford Steam Boiler Inspection and Insurance Co., having commenced the business of inspecting boilers, heard of Mr. Getchell's ability and acquired knowledge and skill, scientific and otherwise, and at once secured his services in 1870. In their service he displayed such ability and judgment that the United States inspector pronounced him the best authority on steam boilers and the use of steam in the State. He was so thoroughly versed and enthusiastic in his profession that whenever he found a defect in the construction of a boiler or in its management, he was ready with a remedy, and rarely made a mistake. Indeed, he made valuable suggestions that were approved and were carried out by the company by which he was employed, thus contributing to safety in the use of steam, and becoming a benefactor to his race in saving much valuable human life and property.

Mr. Getchell as a man was generous and sunny in his nature, always having a kind word with all whom he came in contact. He was a useful member of the Civil Engineers' Club of Cleveland, and of the Society for Preserving Weights and Measures.

A Fertile Inventor.

Col. John A. Price, president of the Scranton Stove Works, Scranton, Pa., has never been very active in the councils of the trade, says the *Metal Worker*, but he has been a successful business man and a fertile inventor. Most of his inventions have had an immediate commercial value, and have been designed to meet a want existing and recognized. In May, 1867, Colonel Price patented an improved low closet for ranges, and in June, 1868, a design for ranges. In January, 1869, he patented a chute slide for parlor stoves; in June, 1870, a combined door and hearth; in April and July, 1878, the well-known construction known as the Dockash grate; in February and March, 1879, other forms of stove grates; in January, 1882, and May, 1883, a valuable improvement in furnace grates; in May, 1883, a range closet; in the same month, a bi-mantel shelf; in August, 1883, a further improvement in furnace grates; in September, 1883, a range shelf; in February, 1884, two forms of furnace grates; in December, 1884, and February, 1885, various forms of water heaters; in February, 1885, a furnace grate; in July, 1885, an oven for ranges; in December, 1885, a new furnace construction; in January, 1886, a stove door; in December 1886, a range closet; in February, 1887, a stove design; in May last, a complete, but very simple and effective water gas producer, and in June a ventilated oven construction in cook stoves. We have not searched the record so carefully as to be sure there are not some omitted from this list, but those enumerated we happen to know about. Many of these inventions have been largely successful, and have tended materially to promote progress in the arts to which they relate. As Colonel Price is still a young man, and has scarcely reached the period of maximum intellectual activity, we may expect that his record as a fertile and useful inventor will be something exceptional. Indeed, it is already.

THE LATE A. C. GETCHELL

The Blow to Our Silk Industry.

The recent decision at Philadelphia of the United States Circuit Court concerning the duty on silk ribbons has created consternation among the silk ribbon manufacturers in this country. The duty under the present law has been held to be 50 per cent. *ad valorem*, but the importers claimed that the ribbons should be admitted as hat and bonnet trimmings at 20 per cent. *ad valorem*, and they have been judicially sustained. A number of petitions have been received since the adjournment of of Congress from persons interested in the manufacture of silk, praying for a legislative remedy for the condition of things which is threatened as a result of the decision of the court. The petitions are largely signed by operatives in silk manufacturing establishments, who say that the decision will have the effect of throwing them all out of work. The opinion is expressed by high official and expert authority that unless an appeal be taken, and this decision be reversed by a high court, it will cause the Government to refund between $7,000,000 and $10,000,000, not to consumers, but to importers, and that it will close every silk factory in this country. It has been finally decided by the Department of Justice that an appeal will be taken to the United States Supreme Court.

THE American trade with Cuba is an important and a growing one. Out of a total of seventy-five vessels arriving at Havana last month, thirty-seven of them were American. British vessels numbered only five.

THE STORY OF A LUMP OF IRON ORE.

Cleveland Plain Dealer, Oct. 25.

Another of the series of practical talks being conducted by the Y. M. C. A., was held in the rooms of that society last evening, and Mr. W. M. Day, of the IRON TRADE REVIEW, was the talker. "A Lump of Iron Ore" was Mr. Day's subject, and his remarks were designed to be untechnical. Mr. Day began by relating some of the theories of geologists regarding the formation of iron ore. He then spoke of the characteristics of mine prospectors who have figured so conspicuously in the Lake Superior region. He pictured the searcher for ore with his many necessary qualifications, traversing the iron districts, and with compass in hand making notes of outcroppings and surface indications of all kinds, and concluded his worded likeness of the successful prospector with reference to the many men who have become "mine kings," but who subsequently went down ingloriously in extending speculations. With the aid of several charts, Mr. Day explained some of the systems used in mining ore, and then turned his attention to the production of iron ore in this country. Last year the Lake Superior region produced 37 per cent. of all the ore used here. Of the Bessemer ore used here, 44 per cent. came from the Lake Superior region. The total consumption of ore last year was 14,631,052 tons. This amount of ore would fill 32,574 trains of 30 cars each. Figuring five such trains to a mile, a line of ore cars, 6,503 miles long, would be formed, and such a train would cover the distance from New York to San Francisco twice over. Fifty thousand men are employed in the industry. Acco rding to the same way of figuring, the production of the Lake Superior district would burden a train of cars 1,528 miles long, equal to the distance from New York to Denver. After explaining the different kinds of pig iron, Mr. Day said that Great Britain's output of pig iron last year was 3,145,000 tons, while the United States produced 3,339,000tons, and this country's production of steel rails last year was more than double that of Great Britain. Mr. Day gave a plain explanation of the manufacture of Bessemer steel, and said that Sir Henry Bessemer has done more within the last thirty years for the iron industry than was done in all of the years before his time. "We are no longer ruled by King Cotton," said Mr. Day, in conclusion, and in so saying, he exposed a picture of "King Pig Iron."

Raw Material Nonsense.

Each manufacturer calls that which he uses as the basis of his goods, raw material; hence what is a manufactured article to one is raw material to another. Pasturage is the raw material to the sheep grower and wool his product. Wool is the raw material of the spinner and yarn his product. Yarn is the raw material of the weaver and cloth his product. Cloth is the raw material of the tailor and garments are his product.

Forest trees are the raw material of the woodman and logs are his product. Logs are the raw material of the lumberman, and lumber his product. Lumber is the raw material of the carpenters and cabinet-makers and houses and furniture are their products.

The mine is the raw material of the miner, ore is his product. Ore is the raw material of the furnaceman and iron his product. Iron is the raw material of the steel manufacturer and steel is his product. Steel is the raw material of the springmaker and springs his product. Springs are the raw material of the watchmaker and watches his product.

Therefore, when men say they want free or untaxed raw material, they mean to admit certain manufactured articles free, in order that other articles of a higher grade might be more cheaply produced. Beware, then, of this cunning device of our enemies who seek thus to ruin our magnificent labor system. A complete system of protection is one that protects everything from the moment the hands of man first touches it up to its highest and most complex manufacture. Nothing which labor has produced is raw material. Away, then, forever with this deceptive cry of "free raw material!" —[E. A. Hartshorn.

ELECTRIC WELDING.

The following is a summary of a paper on "Electric Welding," read by Mr. C. J. H. Woodbury, vice-president of the Boston Manufacturers' Mutual Insurance Co., at the meeting of the American Society of Mechanical Engineers, at Scranton, Pa., October 18. Mr. Woodbury began by stating that since the first of the year there has been a commercial application of electric welding, which has already reached a degree of importance sufficient to render it a live issue in every branch of manufacture to which it has been shown to be applicable.

This process is a new art, for unlike the smith who is confined to iron, steel and platinum, it can weld any two pieces of the same metal or alloy ranging from the most refractory metals to the alloy which fuses at 162° Fah. It will join dissimilar metals when the welding point of one is not too far in excess of the fusion point of the other.

All forms of matter possess in varying degree the susceptibility of permitting the molecular motion necessary for the transfer of electric energy. The ability of any body to conduct electricity in comparison with others of its kind is directly as the area of the cross section and inversely as the length.

Whenever electricity is provided with what is termed a good conductor, it makes no manifestation of its presence, but if there is poor conductivity by reason of small cross section, or poor conductivity of the material, there is resistance to the electricity. Then a portion of the electric energy is expended in producing excessive molecular motion and converted into heat, which is radiant if the temperature is high enough.

The electricity for electric welding is generated by one or two methods. In the direct system, with the induction coil, the dynamo is contained in the machine below the clamps, and the armature contains two windings; the one being a fine winding which is in series with the field magnet coils, and the other winding being merely a bar of copper in the form of the letter U, or less than a single coil. This bar being of a very low resistance, the maximum current is sufficient for welding purposes, and the terminals are connected directly to the copper clamps. Alternating currents are generated in this machine, and used for welding, in order to avoid commutators, which are necessary in direct current machines. It should be remembered that in all dynamos the electricity is generated in alternating currents, and that these currents are in proper turn fed to brushes of opposite polarity, and thus rendered continuous. In an alternating current dynamo, the electricity is conducted from the armature to rings instead of to a commutator, and is thus better suited for large currents, and some forms of the apparatus do not require rings or any moving contacts. There is no electrical reason why an alternating current should be used except the convenience of its manipulation. In fact, the continuous current supplied by secondary batteries has been used for this purpose.

Another form of apparatus termed the indirect system is more conveniently suited for large work, or in places where a number of welding machines are operated by the current from a single dynamo. The welding current is produced by conversion of the comparatively high tension current by means of an inverted induction coil, termed a transformer. The primary circuit from the dynamo is conducted through many turns of fine wire wound around a soft iron ring, and upon this same ring is a single turn of a large copper bar in which the welding current is produced by inductive effect. These currents receive 4,000 to 15,000 alternations per minute.

The welding currents are not changed suddenly or by switches, as such manipulation would not be desirable or even practicable with the great currents used; but in the direct welding machine, a set of resistance coils is placed in the fine circuit which passes around the field magnets, and by interposing more or less of the resistance coils in this circuit, the strength of the magnets is diminished or increased, and the welding current altered accordingly.

With the indirect machine, the amount of the secondary or welding current is controlled by varying the current in the primary coil by means of a kicking coil, or by a variable shunt to the field coils and in other ways.

In either case the apparatus is simple and in full and complete control at will of the operator by movement of a lever, and this action controls the heat.

In the electric welding process, the two pieces to be joined are secured in firm end contact by a pair of adjustable copper clamps which are placed upon the top of the apparatus. An electric current of large volume is passed through the pieces and the contact between them being of less conductivity than the homogeneous metal, heating ensues at this place, as the juncture is brought to the proper temperature by the gradual motion of the regulating lever, and as the metal softens, the clamps are pressed toward each other to insure a continuous metallic union across the bar.

The weld begins at the centre and proceeds rapidly towards the surface, as the temperature becomes greater than at the interior. The heating is further increased by the fact that the resistance of the hot metal is greater than that of the cold metal.

The enormous electric currents used in this welding process sometimes reach 50,000 amperes, but with an electro-motive force of half a volt. and therefore not capable of giving any sensation to a person.

The operation of electric welding is one of the simplest of mechanical processes, requiring but little skill on the part of the operator in comparison to that exact training of hand and eye and long experience necessary for ordinary welding. The operator must understand the color of the proper welding heat of the metal under treatment, but this is readily learned. The work is not manipulated during the process, except when it is desired to reduce the burr at the weld, and it is at all times under observation, and its heat subject to entire control by means of a lever which graduates the strength of the current.

The dynamo generating the electricity is self-regulating, and requires no attention except for lubrication.

There is no unnecessary waste of fuel, the heating being local, and does not extend far from the weld; cotton-covered wire one-fourth of an inch in diameter can be welded without searing the insulation over three-fourths of an inch from the weld.

The time for making a weld varies from a fraction of a second to two minutes, according to the work; although nothing over two inches diameter has yet been welded, but larger machines are in process of construction.

It is not necessary to provide motive power fully equal to the maximum demand, as the time is so short that the momentum of a fly-wheel will serve the same purpose as in a drop press, and give up the surplus energy required.

The power is inversely proportional to the time, and appears to be about proportional to 2.3 power of the diameter in inches, with a slight variation in favor of quick work caused by differences in rates of thermal conductivity of the material

The process is far cheaper than that of hand welding, and also extends to other methods of manufacture, but the comparative expense differs according to the previous conditions in every place where it has been applied thus far.

Its applications in practical work thus far have been confined to butt welding for many purposes, such as continuous wire work, carriage work, axles and tires, cotton bale ties, barrel hoops and wire cables, and many miscellaneous purposes. Axles are made of drop forgings, joining the tool steel edge to a mild steel poll, bars are heated in the middle and upset forming collars, and pipes are joined together—a matter of great value in ice machines. The last might be continued to greater length, but this indicates the range of its practical uses at this early day.

The value of the process, for most purposes, independent from any scientific interest or mechanical ingenuity shown in the apparatus, must be that of the resistance of the welds under tensile stress.

It will be readily understood, however, that, as this process accomplishes many things hitherto impossible, aside from any question of ultimate strength, it is fitted for applications in many constructions where it saves labor and time; provided only that the joints be in all cases sufficiently good for the purpose for which the article is designed. A large field thus opens up in the execution of ornamental design in metal work, where it will supplant screws, rivets or solder for fastenings, and in other evident applications.

The Rail Market.

During the past week orders have been placed by the Vanderbilt system for 21,500 tons of rails. Only part of the order was placed with Eastern mills. A Southern road is negotiating an order for 10,000 tons, and inquiries are in the market from an Oregon road, and a transcontinental line. Eastern mills are asking $28@$28.50, but quotations are generally $27.50@$28.

STEEL RAILS AND STOLID RAILERS.

Boston Commercial Bulletin.

Mr. J. Schoenhof, who, it will be remembered, figured out a Free Trade advantage to this country by comparing brogans with ladies' shoes, is now laboring in his consular reports to show that it should cost as little to manufacture steel rails in the United States as in England. He concludes his report with a vicious slap at the American industry through one of those beautiful averages of statistics, which mean so much to the Free Trader and so little to the man of business. Even Mr. Mills stated the cost of labor in a ton of steel rails was over $4, but Mr. Schoenhof has reduced it to $3.04. The profits being correspondingly enormous, one is tempted to inquire why, if it costs so little to produce steel rails in the United States we do not export them in large quantities in competition with the high cost rails of Great Britain.

In view of Mr. Schoenhof's valuable statistics it is curious that the London *Colliery Guardian*, of December 16, 1887, should have said: "If the duties now levied upon British rails entering American ports should be reduced to *any appreciable extent*, the reduction may exert a happy influence upon the British rail trade. * * * * There can be but little doubt that they [English rails] will come into extended use in the United States if the adoption in whole or in part of Mr. Cleveland's views make them more readily available for American consumption."

Mr. Schoenhof gives the cost of production of a ton of Bessemer steel rails in England as follows:

1 1-10 tons of hematite iron	$12.38
1½ cwt. of spiegeleisen	1.44
14 cwt. of coal	1.26
Labor	3.07
Total	$18.15

The cost of production of steel rails in a mill in Pennsylvania (name omitted) is stated by him to be as follows:

1 ton of pig iron	$18.00
3 cwt. spiegeleisen	4.00
Fuel	2.00
Labor	3.04
Sundries	.50
Extra labor	.84
Total	$28.38

It will be observed that the extra cost of the American rails is distributed over every article, the difference in the cost of labor in the steel mill being, according to Mr. Schoenhof, but 81 cents. The great point of difference is in the cost of pig iron. According to Mr. Schoenhof's own figures, the English cost of labor in producing a ton of pig iron is seventy-nine cents, in America a dollar and a quarter. These are not differences in rates of wages, the comparison between the American and English standards being two-thirds more for the American than for the Englishman, but differences in cost of production.

Mr. Scott originated, and Mr. Mills has circulated the statement that in a ton of steel rails costing $26.79, labor was only represented to the extent of $4.09. Here is the authoritative statement of Mr. James M. Swank, the highest authority on iron and steel statistics in this country. The cost in fuel of course applies not merely to the fuel used in converting pig iron into rails, but in converting ore into pig iron:

Cost of labor in fuel required	$4.70
Cost of labor in ore	5.42
Cost of labor in limestone	.41
Cost of labor at works	8.76
Total	$19.29

Even Mr. Schoenhof cannot support Messrs. Scott and Mills in their extraordinary statistics of production, and Mr. Schoenhof only approaches the truth. All these gentlemen omit taxes, cost of steam power, repairs, general management and insurance, and Messrs. Scott and Mills entirely omit the cost of the necessary spiegeleisen.

Every ton of British steel rails that comes into America takes $19.29 out of the pockets of the American coal, coke, and iron worker and places it in the hands of the British rival. The destruction of the duty would cut down or destroy the means of existence of half-a-million people. There would be but one possible method of survival, the reduction of the cost of labor and transportation, which is one-half labor, in other words, by a continued wholesale importation of contract pauper labor which has been wisely stopped. Are the American people ready for the question?

ANOTHER submarine vessel has made its appearance. A Spanish naval officer is the inventor. It was recently launched at Cadiz, and will be entirely completed next month. The vessel is cylindrical, of 87 tons register, and furnished with a torpedo tube and twin screws. It will be run by electricity.

Industrial Notes

Blast Furnaces:—

It is reported that a large Pittsburgh coal firm is contemplating the establishment of extensive iron works at Cairo, predicated upon their ability to get ore more cheaply from Chicago than Pittsburgh does from Cleveland.

Northampton Furnace, near Freemansburg, Pa., operated by the Bethlehem Iron Company, of Bethlehem, Pa., was blown out on Monday, the 20th ult., and will remain idle until Spring. In the meantime the furnace will be thoroughly overhauled and improved.

The old Huron furnace at Jackson, O., which has been idle since 1884, has been generally repaired, and has been put in operation under the management of a new organization known as the Jackson Iron Company. The furnace has a capacity of 30 tons per day.

From a recent issue of the Sharpsville (Pa.) *Times*, we take the following information relating to the blast furnaces in the Shenango Valley: "Mabel Furnace has been making a phenomenal output of iron lately, and can lay claim to having the best record of any furnace in the valley. This furnace is making on average of 120 tons of Bessemer iron per day, with a maximum daily output of 130, the latter amount having been made last Monday. This, for a 65-foot stack, will be hard to beat. The Claire furnace is also making a large amount of iron, her best day's output being 147 tons of Bessemer. This furnace has a record of 896 tons per week. The Sharpsville Furnace, which was blown out some time ago, is undergoing extensive repairs which will largely increase the output of iron when it is again put in blast. The old bosh has been torn out, the salamander taken out, and a new bosh is being put in. A new hot blast, of Pierce patent, is being built, and other improvements made which will take some time to complete."

Rolling Mills:—

It is reported that the Pacific Iron & Nail Company, of Oakland, Cal., will shortly begin the erection of a $60,000 wire plant.

The National Rolling Mill of McKeesport, Pa., is to construct a 24-inch plate mill department, to manufacture sheets for making 24-inch tubes. The new department will be placed in operation about January 1, and will employ a large number of men.

The Light Rolling Mill Company, of Lebanon, Pa., has purchased the plant of the Port Carbon Iron Company, consisting of eight puddling furnaces and two sets of rolls. The machinery and material will be shipped at once from Port Carbon, Schuylkill county, to Lebanon.

Nebraska is to lose its only rolling mill, as it is reported that the plant of the Union Steel Nail Company, at Omaha, is to be removed to St. Joseph, Mo. Upon its removal it will be greatly enlarged and modernized. The title of the corporation is to be changed to the Union Steel & Iron Company. The following are officers of the new company: Wm. Haven, president; George T. Walker, vice-president; and W. N. McCandlish, secretary and treasurer.

November 1st an explosion of hot metal occurred at the Sable iron works of Zug & Co., on Thirteenth street, Pittsburgh, killing a workman, George Smith, aged 29 years, and seriously burning Joseph Klein, aged 56 years, his son, aged about 15 years, and John Zutro, aged 27 years. The elder Klein is so badly injured that he will die. The men were employed in the furnace department and were engaged in pouring the molten metal into a buggy or car when it was accidently upset and the hot iron ran into a puddle of water. A terrific explosion followed, demolishing the furnace and a portion of the mill, and scattering the metal over the men.

Moorhead, Brother & Co., of Pittsburgh, proprietors of the Vesuvius Iron & Nail Works, at Sharpsburg, Pa., are using coal gas made by a new process, which enables them to furnish fuel for a ton of iron at a cost of a little over $1 for heating and puddling. A heating furnace in operation for several weeks has shown the cost in the heating process to be less than 60 cents per ton. Two new double puddling furnaces, which are to be furnished with fuel made under the same process, are about ready to be lighted. The new method will effect a saving of almost $4 in making 10,000 pounds of muck bar in a quadruple puddling furnace, and nearly half as much in a double puddling furnace.

When the new gas heating furnace at Belfont nail mill was built, says the Ironton (O.) *Register*, it was placed on ground that had been filled up with ashes. Though a clay and brick foundation was laid on which to build the furnace, the heat has communicated to the ashes and set them afire, and the conflagration was in a fair way to permeate the ashy foundation, on which a considerable portion of the works are built. So, to cut off the fire, a trench has been dug 60 feet long, and 20 deep, and filled up with clay to stop the progress of the fire. This work will be effective and no further trouble is apprehended. The fire has not interfered with the working of the heating furnace. Some years ago, there was a similar trouble and about that time the river became very high and backed over the ground where the subterranean fire raged, but it seemed to burn brighter after the river receded. So the company had to dig a trench that cost $1,000 before they could stop the fire.

Steel Works:—

An experimental lot of crucible cast steel made by a new process, known as the Kingsland-Sinclair process, was recently turned out by Howe, Brown & Co., Limited. The point claimed by the inventor for his process, is that a crucible steel equal to the celebrated brands of Mushett steel can be produced for about one-fifth the cost of the above-named brand. Recent tests are said to have been very satisfactory.—[American Manufacturer, Pittsburgh.

South Carolina may be expected, in the near future, to again enter the ranks of iron-making States. The Magnetic Iron & Steel Company was recently chartered at Columbia, S. C. The company is composed of Birmingham and Atlanta capitalists, and has purchased for $60,000 the greater part of the magnetic iron ore lode, near the town of Blacks, in York county. The tract is said to contain a large deposit of magnetic iron ore, low in phosphorous and silica. It is the intention of the company to lay out a town, after the plan of so many towns recently started in Alabama, and to build a blast furnace, to be followed by other industrial works. Coal, charcoal and limestone are readily obtainable.—[Philadelphia Bulletin.

Machine Shops:—

The Hill Friction Clutch Pulley Company, Cleveland, are increasing the capacity of their works.

The Minersville (Pa.) machine shops, idle for several years, have been purchased by L. S. Allison, of Hazleton, and are being put in operation.

Messrs. Marchultz & Cantrell, National Iron Works, San Francisco, are engaged on plans for a new brick machine shop and foundry, to be erected on the site of their old works.

H. K. Porter & Co., of Pittsburgh, builders of light locomotives, have received an order from the Japanese Government for two Mogul 42-inch gauge locomotives, to be used on the Paranai Railroad, in the island of Yesso.

Lloyd, Booth & Co., are building a pair of 25-ton shears, to be placed in the Warren mill, and to be used in shearing railroad car axles into billets. They are also building a mill for the Tudegar Iron Co., of Richmond, Va., and a mill to be erected at Duluth, Wis.—[Youngstown (O.) Telegram.

The Niles Tool Works, of Hamilton, O., have increased the size of their machine shop. It now affords a clear working space of 116x400 ft., divided into three portions, middle and two sides, and extending the whole length of the building. Two twenty-ton traveling cranes command the entire middle length, and stationary cranes are located at frequent intervals in the aisles. A new blacksmith shop, 55x120 feet, has just been completed.

Lodge, Davis & Co., Cincinnati, inform us that they have recently booked some very large orders, including tools, for the Long & Allstatter Co., Hamilton, O.; the Missouri Pacific Railway Co., St. Louis, Mo.; East End Gas Works, Cincinnati, O.; Hoffman Machine Co., Detroit, Mich.; the Eagle Iron Works, of Detroit, and several others. They have sold as much as thirty-five and forty duplicates of machine tools, on exhibition in the Cincinnati Centennial Exposition, and have a large number of orders on their books yet unfilled. They shipped two car-loads of machinery to San Francisco last week.

Foundries:—

The Beckett Foundry & Machine Co., of Arlington, N. J., has shipped the past week a 25-ton steam hoist to one of the iron mines of the estate of J. Cooper Lord, Port Oram, N. J. The hoist has two cylinders, 15x24 in., and two friction drums, 6 ft. diameter. The company also has orders for mining machinery from South America and Mexico.

The Oregon Foundry Company has been chartered, to do business at Oregon, Ill.

The Southwark Foundry & Machine Company, Philadelphia, is building an addition to its buildings of 136x107 feet, with a wing 100x57 feet. Two traveling cranes, one 30 tons and the other 50 tons, will be placed in the new works. They are at present at work on orders from the Pennsylvania Steel Works, Cambria Iron Works and the Norfolk and Brooklyn navy yards.

The Mitis Wrought Iron Casting Company, of Neponset, Mass., the original establishment in this country doing that work has been obliged to double the capacity of their works within the past six weeks, and now have six crucible furnaces. The fuel used is crude petroleum, which is led by pipes to the front of the furnace and dropped onto grate bars.

Fires in Iron Works:—

The Sherman (Tex.) Iron & Machine Works, recently burned, will be rebuilt at once.

The charcoal iron furnace of the Appleton Furnace Company, of Appleton, Wis., was burned on the 28th ult.

Fire destroyed the Faraday Carbon Works, and Auburn & Ackerman's axle factory, Pittsburgh, Oct. 29. Loss, about $90,000; fully insured.

The works of the Columbus (O.) Bridge Company, were totally destroyed by fire November 1. Loss is estimated at $20,000, of which $16,000 is on machinery. Insurance, $4,000.

Hardware:—

The New Castle (Pa.) Wire Nail Company has sent to Germany for $80,000 worth of manufacturing material which cannot be had in this country.

The Iron City Mfg. Company is the name of a new organization that has succeeded to the business of Geo. Y. McMurty, manufacturer of hot-pressed nuts, at Pittsburgh, Mr. McMurty having disposed of his entire interest in the business. Robert J. Taggart is secretary and treasurer of the new firm.

At a meeting of the stockholders of the Bryden Horse Shoe Company, Limited, of Catasauqua, Pa., held in that place on Thursday, the 25th ult., it was decided to increase the stock of the corporation. It is intended to erect new works and enlarge the plant considerably. The new works will be in operation about the 1st of December next.

Articles of incorporation were filed in the Recorder's office in Kansas City, Mo., October 8, by the Western Electric Lock Company, with a capital stock of $100,000. The purposes for which the corporation are formed are to manufacture, sell and deal in the Gill electric combination lock in all its various applications in connection with railroads, telegraphs, telephones, military and naval purposes, police and fire departments. The company will also deal in all other electrical contrivances of this character. The incorporators are Benjamin F. Jones, Edward L. Martin, and Alfred W. Jones.

Miscellaneous:—

The National Tube Works Company, of McKeesport, has commenced the erection of a new puddle mill which will comprise 20 furnaces, a squeezer and a set of muck rolls.

A Louisville, Ky., dispatch states that on October 23d, the United Jellico Coal & Iron Company was organized at Louisville, with a capital stock of $5,000,000. The company is said to have secured control of 60,000 acres of coal and iron ore lands in the Jellico mountain region of Campbell county, Tennessee.

Incorporated:—The American Heating Company, at Chicago; capital stock, $500,000; incorporators, Lewis K. Curlett, Henry Boyce and Robert Johnson.—Automatic Lubricating & Tubular Axle Company, Chicago; capital stock, $1,000,000; incorporators, Alfred Post, Frederick J. Seymour, Louis Leland, Murat Masterson.

Ye editor has a nice steel rule and a leather case in his hip pocket, with the compliments of the Iron Trade Review, Cleveland, O. We are going to stop guessing at things now, and measure.—[Locomotive Engineer, New York.

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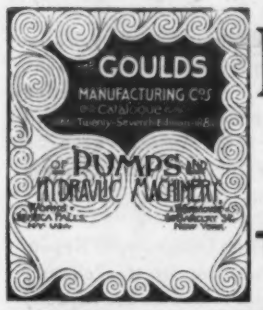

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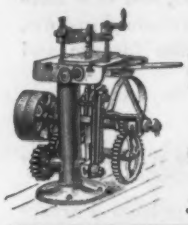

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THE HOTCHKISS & UPSON CO. Manuf'rs. Machine, Plow & Elevator Bolts, Coach Screws. 15

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SMITH & TEACHOUT—(Established 1857.) Boilers, Tanks, Stills, etc. 644 Broadway.

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THE COLWELL & COLLINS NORWAY BOLT CO., manufacturers of Philadelphia Carriage and Tire Bolts. 41

Coal, Iron and Ore.

PICKANDS, MATHER & CO., Iron Ore and Pig Iron, Cor. Bank and Superior Sts. 61

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INDUSTRY FILE WORKS, A. & H. Gough, manf'rs of Files and Rasps, equal to the best English file. Old files re-cut. All kinds of Job Grinding. Office and Works, 38 Columbus and 33 Winter street 13

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BOWLER & CO., Car wheels, Patent Chilled Frogs, and all kinds of castings. 9 Winter.

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BINGHAM, WM. & CO., Hardware, Iron, Nails and Metals, 148 and 150 Water St.

CLEVELAND ROLLING MILL CO., manufacturers of Steel and Iron Wire and Steel Tire. 34

THE EBERHARD MF'G CO. manfrs of Carriage, Wagon and Saddlery Hardware. 25

Hardwood Lumber.

MARTIN & BARRISS, dealers in all kinds of Hardwood Lumber. 130 Central Way. 51

Lumber.

FISHER, WILSON & CO., Wholesale lumber dealers (pine & hardwood), rough and dressed lumber, timber, lath, shingles, etc. 47 Central Way. 82

Steel Stamps and Stencils.

FLEHARTY, J. H. & Co., Rubber Stamps, Seals, Stencils. 92 Seneca street. 54

BUSINESS DIRECTORY.

Akron, O.

MCNEIL, J. C. CO., Steam Boilers, Heavy Sheet Iron Work, &c. Repairing promptly executed.

TAPLIN, RICE & CO., manuf'rs. of Stoves and Hollow Ware, dealers in Tinners' Stock, etc. 04

WEBSTER, CAMP & LANE MACHINE CO., Founders and Machinists, 12 Main street. 84

Alliance, O.

CHAPMAN G. L., builder of Engines and Machines Also Jobbing and Repairing.

Canton, O.

NOVELTY IRON WORKS, Mill Work, Shafting, Engines, Imperial job printing press etc. 73

Hinckley, O.

ISHAM, W. S. Tin cans of every description Large job lots special prices. Correspondence solicited. 81

Meadville, Pa.

CURRY & CO. general jobbers in Castings of all kinds. 43

Mansfield, O.

MANSFIELD STEAM BOILER WORKS, Man'frs of Steam Boilers, Oil and Water Tanks, and all kinds of Sheet Iron Work. 03

Niles, O.

REEVES BROS., Manufacturers of Boiler, Tank and Sheet Iron Work, etc. 64

Struthers, O.

SUMMERS BROS. & CO., manufacturers of Box Annealed Common and Refined Sheet Iron, and Superior Quality Shingle-Bands. 61

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AUST & CLARK PROPRIETORS

LITHOGRAPH BUILDING CLEVELAND, O.

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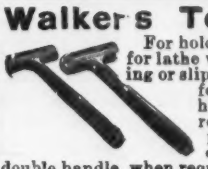

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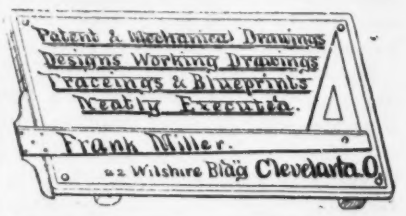

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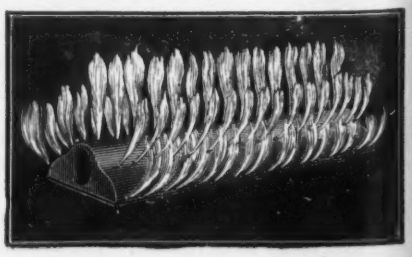
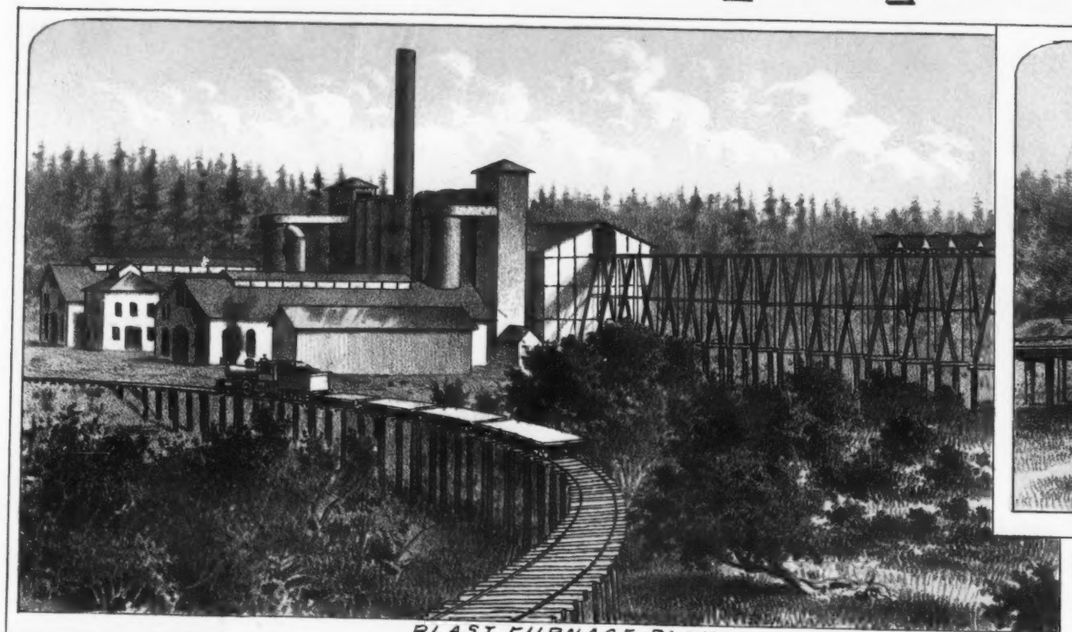
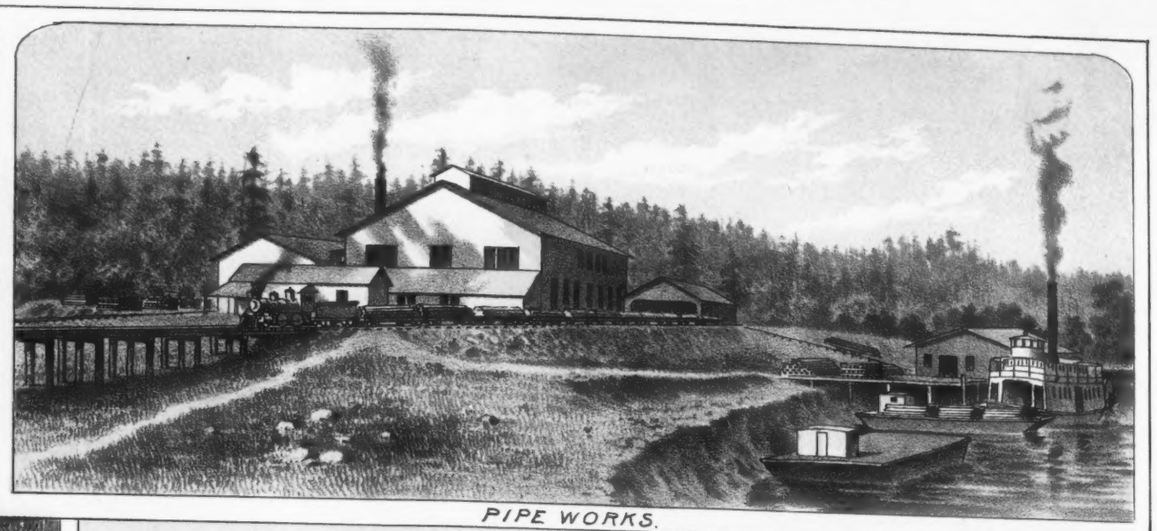
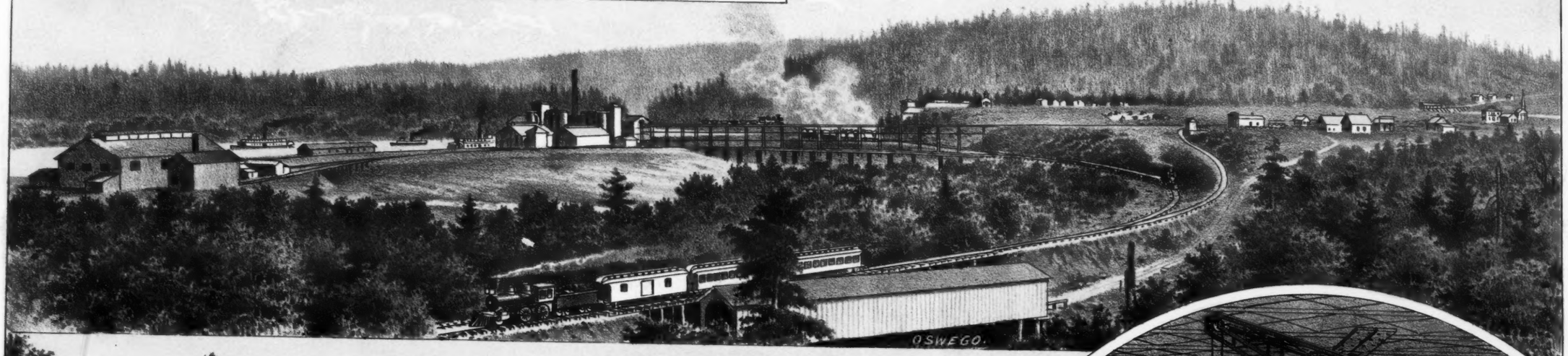




BLAST FURNACE PLANT.

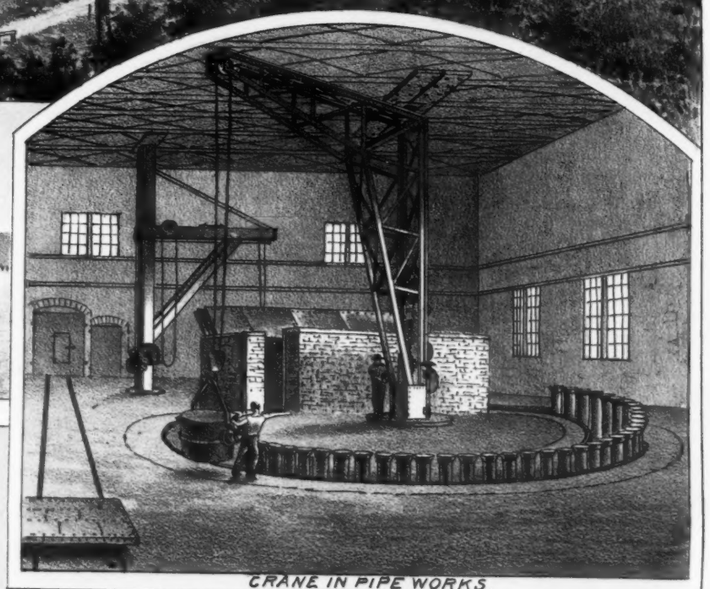


PIPE WORKS.

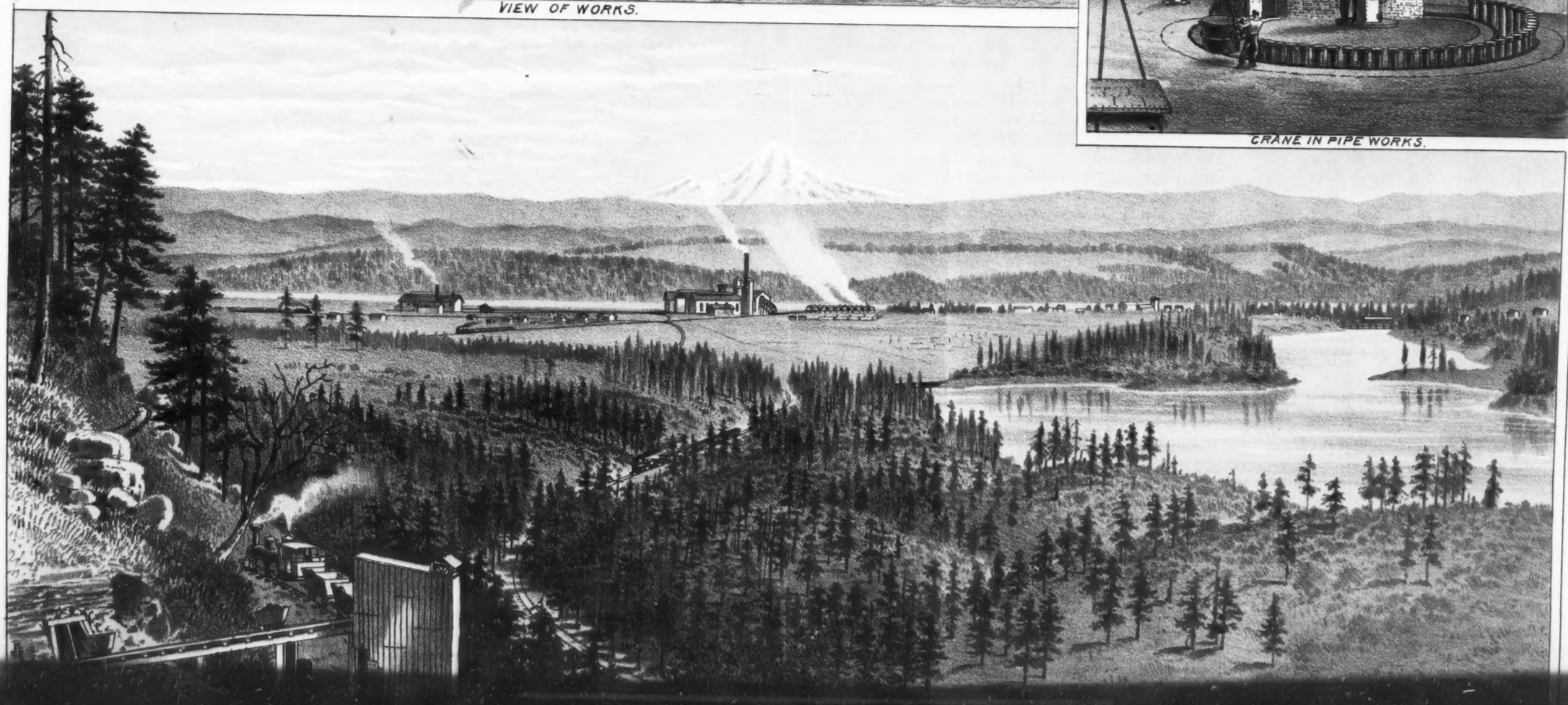


OSWEGO.

VIEW OF WORKS.



CRANE IN PIPE WORKS.



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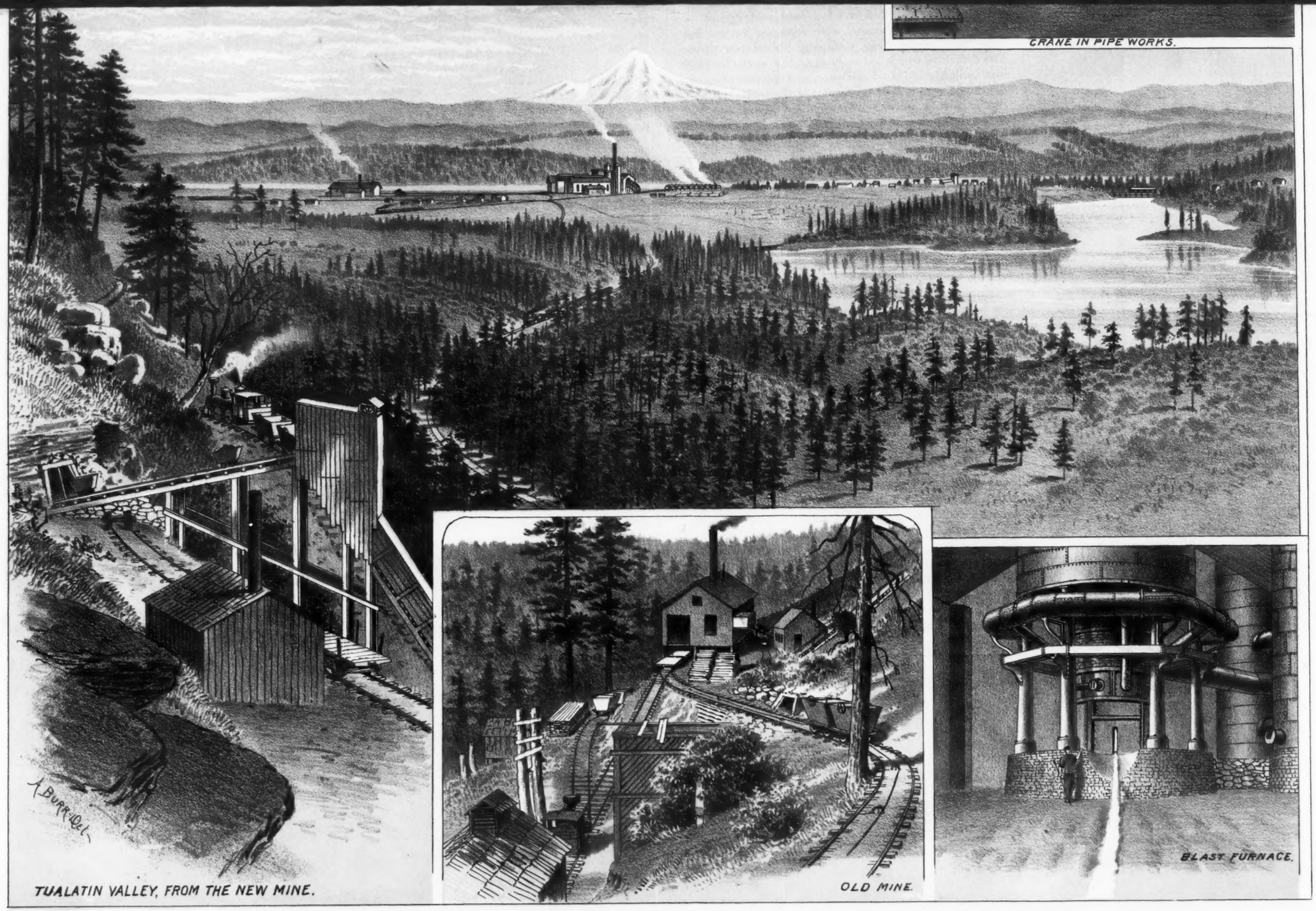

TUALATIN VALLEY, FROM THE NEW MINE.

OLD MINE.

BLAST FURNACE.

MINES AND WORKS OF THE OREGON IRON AND STEEL CO. AT OSWEGO, OREGON.

(OVER.)

OREGON IRON &

The largest iron manufacturing establishment in the west is the plant of the Oregon Iron & Steel Company, at Oswego, Oregon, on the west bank of the Willamette, a few miles above the city of Portland. The plant includes the only pipe foundry west of St. Louis, and, with one exception, the only blast furnace west of the Rocky mountains. It comprises valuable mining property, blast furnace and pipe foundry, and all the necessary adjuncts for mining and manufacturing iron on an extensive scale.

The first step for the establishment of an iron manufacturing plant here was taken in 1865, when the Oregon Iron Company was organized, with a capital stock of $200,000.00. The articles of incorporation bore date February 23, 1865. Operations were immediately commenced, and the first pig iron was made August 24, 1867. This was the first iron ever made west of the Rocky mountains. During the time this company operated the plant, about ten years, it turned out seven thousand four hundred and sixty tons of pig iron. In 1878 the Oswego Iron Company bought the Oregon Iron Company's property, and had made eighteen thousand five hundred tons of pig iron at the time of selling out to the Oregon Iron & Steel Company, February 26, 1882. This last named company operated the works until November, 1885, during which time it made fourteen thousand six hundred and sixty-three tons of pig iron. At the last named date the works were closed, and have remained so since. About the first of October next, work will begin with a greatly enlarged plant and complete modern equipments.

The first charcoal furnace erected was run by water power, and had wooden tubs and cylinders. These wooden appliances were removed during the time the Oregon Iron Company owned the plant. The difficulty which led to closing the works in 1885 was amicably adjusted last year, and the company reorganized with a paid up capital of $1,500,000 00, and the first step toward resuming operations was the construction of new works throughout. The old plant was entirely discarded. Even a new mine was opened. January 1, 1888, the construction of the new furnace was begun, and the work was pushed to completion. The blast furnace has a thirteen-foot bosh and is sixty feet high, with five five-and-one-half-inch tuyers. The bosh walls are protected by water blocks, and the column of the furnace is lined with fire brick two feet in thickness, with a back wall of red brick eighteen inches thick. The down-comer gas flue, from the furnace to the stoves and boilers, is of wrought iron, six and one-half feet in diameter, lined with fire brick. For heating the blast, there are three stoves of fire brick, with wrought iron shells, fifteen feet in diameter and seventy-five feet high, with conical tops. These stoves are lined with a checker work of fire brick. This checker work is heated to a white heat by waste gas from the furnace, then a cold blast is turned on at the reverse side and forced up and down through the stoves until it absorbs the heat, when it is carried back to the furnace. The blowing engine is of the Weimer type, having a total weight of one hundred tons, and a capacity of eight hundred horse power. The capacity of the blow is twelve thousand cubic feet of air per minute, with ten pounds pressure to the square inch. The power for running this machine is furnished by two batteries of French type boilers. No fuel is used either in generating steam or in heating the stoves, this service being performed entirely by waste gas from the furnace. The smoke-stack is

& STEEL WORKS.

of wrought iron, nine and one-half feet in diameter and one hundred and sixty feet high, and is lined with nine inches of fire brick from bottom to top. The elevator has two cages, one ascending while the other descends, and is capable of lifting five thousand pounds. The stock house is sixty by one hundred and eighty feet, with two ore bins, or bunkers, with a storage capacity of three thousand tons each. The lime house, in one end of this building, holds three thousand tons of lime rock. Seven hundred thousand feet of lumber were used in the construction of this stock house.

The mine of the company is about two and one-half miles west of Oswego, and is connected with the works by a narrow gauge railroad. It is a fissure vein of brown hematite, averaging ten feet in thickness, the ore yielding forty per cent. metallic iron. The old mine penetrated the hill in which the ore is found for a distance of about a thousand feet. The ore is first shoveled into cars at the mine, hauled out and dumped into bunkers, from which cars on the Oregon Iron & Steel Company's narrow gauge railway are loaded and drawn to the furnace stock house. There it is weighed on the cars and dumped into the crusher, from which it passes to the bunkers in the stock house. From there it drops into receptacles, is weighed again and hoisted to the top of the blast furnace, where it is charged. The molten metal from this furnace is cast into pig iron, and is then ready for further manufacture.

The charcoal kilns are thirty-six in number, located near the furnace. They are of the bee hive pattern, thirty feet in diameter and thirteen feet high, each with a capacity of fifty cords of wood, which makes twenty-five hundred bushels of coal, and they can be turned twice a month. The railroad track runs along above the kilns, which are charged from the top. It requires the coal from one hundred cords of wood to run the furnace one day to its total capacity of fifty tons. A cable road takes the coal from the kilns to the furnace.

The company's pipe foundry has a main building sixty-eight by one hundred and eighty feet, supplied with one ten-ton steam crane and three five-ton hand cranes. It has a large pit for casting pipes vertically, and a capacity for turning out twenty-five tons daily, pig iron being taken from the furnace and remelted for this purpose.

The above is only a very brief mention of the principal features of the plant of the Oregon Iron & Steel Company. There are engine houses, pattern houses, machine shop, and sundry other adjuncts of a first-class iron manufacturing establishment, everything new and on modern plans. There is an admirable arrangement by which a supply of two and one-half million gallons of water daily is secured, with a head of sixty feet above the hearth. The shipping facilities are both rail and water. The officers of the company are: President, S. G. Reed; vice president, Wm. M. Ladd; secretary, Martin Winch; general superintendent, F. C. Smith; furnace engineer, E. C. Darley; engineer pipe foundry, Franklin J. Fuller; superintendent of mines, James H. Pomeroy. The company owns two thousand acres of mineral land and fourteen thousand acres of timber land in one body. It also has ten thousand six hundred acres of timber land in Washington Territory, and a mine of magnetic iron ore in British Columbia. The land in the vicinity of the works is laid out in town lots, and Oswego is a very pleasant place of residence.

MARKET REVIEW.

OFFICE OF IRON TRADE REVIEW.
CLEVELAND, O., WEDNESDAY EVENING, November 7, 1888.

Iron Ore.

There seems to be a total cessation of activity among dealers in iron ore, caused, no doubt, by the fact that practically all the ore that can yet be sent down has been sold, and that there is nothing more to sell except a very little stock in the way of odd lots, which command fancy prices. Nothing will be done now by the producers, until the yearly returns show the extent of ore consumption, so as to enable them to estimate their '89 output and its price. If the promises held out by the railway interests are fulfiled, the demand for steel rails, delivered for '89 use, will be something enormous. As a matter of fact, the mills have been offered several large contracts, but the price does not warrant them to accept any orders, more especially, in view of the high price of Bessemer ores. Coke is rising, and another advance is predicted soon, so that the new year will probably see the rate go up to $1.50.

Pig Iron.

A dearth of transactions has characterized the local market for the past week, occasioned, no doubt, by the excitement incident to the recent election. Small lots, to tide over a few days, are taken at full prices, but large lots are neither offered nor sought at present. Furnacemen do not expect much new business until the end of November, but it is generally conceded that a sharp advance in pig metals will take place before January 1. The consumption of pig iron has not in the least abated, and instead of accumulating reserve stocks, many furnaces have all they can do to fill their engagements. We quote, f. o. b., Cleveland, four months:

No. 1 Bessemer	$18 70@19 20
No. 1 foundry	18 20@19 70
No. 2 fonndry	17 20@17 70
No. 1 gray forge, red short	16 70@17 20
No. 2 gray forge, neutral	16 20@16 70
No. 1 American Scotch	18 20@18 70
No. 2 American Scotch	17 20@17 70

Manufactured Iron.

The same temporary dullness that seems to prevail in other branches of the iron industry, is perceptible in this market, and there appears to be a diminished demand for bars, sheets and shapes. Quotations are full, however, and the prices strong.

Scrap Iron.

Old material is the most active on the list, with old American rails selling freely at $24@$24.50, and No. 1 choice scrap at $23. One sale of wagon tires is reported at $25 for a 200-ton lot.

Hardware.

The jobbers are well satisfied with their trade, and expect a further improvement with the beginning of the holiday season.

CINCINNATI PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Rogers, Brown & Co

Notwithstanding the general disposition to drop all buying till after the election, a few purchasers have been in the field and closed contracts covering considerable amounts. The tone of the market is not changed. Some small sales of Southern coke iron have been reported at slight concessions, but sellers claim they were for immediate delivery only. For long scattered deliveries, sellers are generally very firm, or decline entirely to quote. It is believed that after the election a uniform business may be looked for, at prices that will represent at least no further decline. We quote for cash (Nov. 3):

HOT BLAST FOUNDRY.—Ohio and Southern Coke, No. 1, $16 50@$17 00; Ohio and Southern Coke, No. 2, $15 75@$16 00; Ohio and Southern Coke, No. 3, $15 50@$15 50; Ohio Soft Stonecoal No. 1, $17 00@$17 50; Ohio Soft Stonecoal No. 2, $15 50@$16 00; Mahoning and Shenango Valley, $17 50@$18 50. CHARCOAL IRON.—Hanging Rock Charcoal No. 1, $21 00@$22 50; Hanging Rock Charcoal No. 2, $19 00@$22 00; Tennessee and Alabama Charcoal No. 1, $18 00@$19 50; Tennessee and Alabama Charcoal No. 2, $17 00@$18 00. FORGE—Strong Neutral Coke, $14 75@$15 00; Mottled Neutral Coke, $13 75@$14 00; Cold Short Coke, $14 50@$14 75. CAR WHEEL AND MALLEABLE—Southern Car Wheel, $20 00@25 00; Hanging Rock Cold Blast, $22 00@$25 00: Lake Superior Malleable & Car Wheel, $21 00@$22 00.

DETROIT PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by William F. Jarvis & Co.

A duller week of business cannot be imagined than that which has immediately preceded the election. While Michigan has been called a doubtful State by the Democrats, it has, by being put under this classification, stirred the Republicans up to such a working pitch that it has made politics and business nominal, and the natural consequence is, that the pig iron interests are the most active workers for the cause of protection. They all say they expect to do a large business if Mr. Harrison is elected, so that our report in the near future ought to show larger volume of business and a higher range of prices, and with quotations nominal, we report as follows (Nov. 5):

Lake Superior Charcoal, all numbers, $20 00@$20 50; Lake Superior Coke, all ore, $19 75@$20 25; Lake Superior coke, cinder mixed, $18 50@$19 00; Standard Ohio Blackband, $19 75@$20 25; Southern No. 1, $17 75@$18 25; Southern Gray Forge, $16 25@$16 75; Southern Silvery, $17 00@$17 50; Jackson County (Ohio) Silvery, $18 50@$19 00; Old Wheels, $20 50@$21 50.

CHICAGO PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Rogers, Brown & Co.. W. W. Backman, Resident Agent.

We note rather light buying in the Northwest. All interest is centered in politics, and neither buyers nor sellers care to make important engagements. There is no diminution of work, except, perhaps, in architectural foundries. In car building there is a noticeable improvement. One contract for 1,000 cars, and others of less size have recently been placed, while still larger lots are shortly to be let. This makes a strong demand for car wheel irons, especially the chilling grades, which are rather scarce. We quote for cash, f. o. b., Chicago (Nov. 3):

Coke and Bituminous Coal Foundry:—Ohio (Hanging Rock softeners), $18 50@19 00; Ohio (Black Band softeners), $18 50@19 00; Ohio (Jackson county softeners), $18 25@18 75; Lake Ore and Cinder softeners, $17 75@18 25; Southern coke foundry No. 2, $17 50@18 00; Southern coke foundry No. 2½, $17 00@17 50; Southern coke foundry No. 3, $16 50@17 00. Old material:—Old iron rails, $24 00@25 00; Old car wheels $19 00@20 00. Charcoal Foundry:—Lake Superior, $19 50@21 00; Southern, $19 50@21 00; Hanging Rock, $21 00@23 50. Car Wheel and Malleable:—Lake Superior, $19 50@21 00; Standard Southern, $21 50@26 50; Hanging Rock Cold Blast, $24 50@27 00; Hanging Rock Warm Blast, $22 50@24 50.

ST. LOUIS PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Rogers, Brown & Co

Something of an improvement in demand is noticed here, in spite of political drawbacks. Business the past week was better than the week previous. No change in prices, and it is not thought probable that there will be any important change either way for the remainder of the year. The product of Southern coke iron is increasing, but apparently no faster than it is required for increased consumption North and South. We quote for cash at St. Louis (Nov. 3):

Charcoal Foundry—Southern No. 1, $18.00@$19.00; Southern No. 2, $17.50@$18.50; Missouri No. 1, $17 00@18 00; Missouri No. 2, $16.50@$17.50. Coal and Coke Irons.—Ohio Softeners, $18 00@21 00; Southern No. 2, $16 50@$18 00. Mill Irons.—Missouri, $16 00@16 50; Southern No. 1, $15 00@$16 50; Southern No. 2, $15 00@16 00. Car Wheel and Malleable Irons.—Lake Superior, $20 00@21 50; Southern, $20 00@24 00; Connellsville Coke, East St. Louis, $4 70; Connellsville Coke, St. Louis, $4 85.

LOUISVILLE PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Geo. H. Hull & Co.

The market has been quiet, with few large sales. These, however, have been at slight reductions in prices. Political excitement has caused some unsteadiness in iron, and furnacemen are uncertain whether to sell at once for future delivery, or wait further developments. Foundries report orders ahead, and none are complaining of scarcity of work. Old rails and wheels are quiet; rails are worth $23.00; old wheels, $20.50. We quote as follows (Nov. 2):

Southern Coke, No. 1, Foundry, $16 75@$17 75; Southern Coke, No. 2, Foundry, $15 75@$16 25; Southern Coke, No. 2½, Foundry, $15 25@$15 75; Hanging Rock Coke, No. 1, Foundry, $17 00@$17 50; Hanging Rock Charcoal, No. 1, Foundry, $20 75@$23 00; Southern Charcoal, No. 1, Foundry, $17 75@18 25; Silver Grey, different grades, $14 25@$15 00; Southern Coke, No. 1, Mill Neutral, $14 50@$15 00, Southern Coke, No. 2, Mill, Neutral, $13 50@$14 50; Southern Coke, No. 1, Mill, Cold Short, $14 00@$14 50; Southern Charcoal, No. 1, Mill, $15 50@$16 25; White and Mottled, different grades, $13 25@$13 50; Southern Car Wheel, Standard Brands, $22 75@$23 75; Southern Car Wheel, other brands, $19 00@$21 00; Hanging Rock, Cold Blast, $22 00@$25 00; Hanging Rock, Warm Blast, $19 00@$20 00.

ENGLISH IRON AND METAL MARKETS.

S. W. Royse & Co.'s report to the IRON TRADE REVIEW.

MANCHESTER, Eng., October 26, 1888.

The position of affairs in pig iron is fairly satisfactory; prices, after fluctuating considerably, now remain about the same as at the beginning of this month. Shipments have somewhat fallen off at both Glasgow and Middlesbrough, but the blowing out of furnaces at the former place will tend to strengthen prices, and this should be increased by the enhanced cost of fuel. Statistics recently issued relating to the production of pig iron in the United Kingdom, show an increased production of 128,992 tons, and a reduction of stocks by 104,824 tons during the six months ending June 30th last, as compared with the previous half-year. Copper has lost ground during the past month; it is reported that the syndicate has extended over a further period its arrangements with the Copper Mining Companies, and has for the present ordered a reduction of the output, a higher price being by the syndicate as compensation for this. Lead, after a heavy fall about a week ago, consequent upon the reported failure of leading operators in New York, has somewhat recovered, having during the last few days secured a good advance. Spelter has been steady throughout the month and closes firm. Tin also is firm.

VARIETIES OF IRON ORES.

The chief iron ores are the following:

Magnetite, containing, when purest, over 72 per cent. of iron.

Hematite (with its varieties, "specular iron," "kidney iron," "micaceous iron," &c.,) containing, when purest, nearly 70 per cent.

Limonite (with its varieties, "kidney iron," and "bog iron ore,") containing, when purest, about 60 per cent.

Gothite, containing about 73 per cent.

Chalybite, with its varieties, "spathose iron ore," "clay band," and "black band," containing, when purest, about 48 per cent.

Of these, the first two are anhydrous oxides, the next two hydrous oxides, and the last a carbonate.

In addition to these names, iron ores are named from their physical characteristics.

Hard and Soft, which names need no explanation.

Specular, so-called from its bright shining micaceous look. The term micaceous, is also sometimes applied to to this variety of ore.

Brown and Red Hematites, so-called from the color of the ore.

Pipe ore, from its resemblance to clay pipe stems.

Belgium's Iron Exports to the United States.

From Consul Stewart's Report.

Iron in bars and sheets.—During the half year of 1888 there left Belgium 110,000 tons, being a slight decrease as compared with the corresponding period of the preceding year. The United States took respectively 4,700 and 5,300 tons of the above quantities, being a slight decrease for 1888.

Old iron.—Scarcely any was exported during the half year of 1888, while the statistics give the exports of the corresponding period of the preceding year at 7,500 tons, 6,400 of this (85 per cent.) having gone to the United States.

Iron rails.—There were exported 5,408 tons in the six months of 1888, being a decrease of about 1,500 tons as compared with the corresponding period of 1887. In the exportation to the United States of this article, the decrease was in larger proportion, the figures having been 750 tons in 1888 against 1,042 tons in 1887.

Steel rails.—The exports during the half year of 1888 amounted to 28,041 tons, being a slight increase over 1887. Only a few hundred tons of this went to us.

The Panama Canal.

The Paris correspondent of the *Economist* writes that M. de Lesseps and his son are stumping the country to revive the confidence of the public in the Panama Canal, and to induce them to put more money at their disposal by the formation of local committees to obtain conditional subscriptions for the 1,200,000 lottery bonds not subscribed. The share and bondholders of the Panama Company are stated to number 600,000, and the idea is that each one should subscribe two new bonds conditionally on the full number being thus taken up. If not, subscribers are to be released from their engagement. The story of these bonds having been all taken up by a group of French banks seems, therefore, as legendary as the construction of the canal itself.

MARYLAND has 488 canning establishments, with 25,000 employes, who receive over $10,500,000 in wages annually. Twenty-two million cans are annually required for the oyster product alone.

ICE was artificially manufactured by the use of chemical mixtures, as early as 1783.

LIST OF PATENTS.

Relating to Iron, Steel, Metal, Machinery, Hardware and Mining Interests.

Reported expressly for this paper by H. T. Fisher, (late Ex. U. S. Patent Office), Patent Attorney, 34 Blackstone Building, Cleveland, O.

BEARING DATE OCTOBER 30, 1888.

Chain-link, F. Egge, Bridgeport, Conn.
Furnace-feeder, W. E. Allington, East Saginaw, Mich.
Iron, apparatus for cleaning sheet, T. G. Turner, Marshallton, Delaware.
Metal crossing, cast G. P. Graham, South Chicago, Ill.
Metal, varnishing, C. Harrop, Birmingham, Warwick County, England.
Metallurgical furnace, T. McSweeney, Allegheny, Pa.
Nut-drilling machine, H. T. Taylor, Detroit, Mich.
Pipes, mandrel for bending lead, J. J. Carr, Brooklyn, N. Y
Roofing, edge turner for sheet-metal, W. K. Patrick, Urbana, Ohio
Sheet-metal polishing machine, A. Johnston, Ottumwa, Iowa.
Splint, metallic J. E. Lee, Conshohocken, Pa.
Swaging and compressing machine, H. H. Taylor, Detroit, Mich.
Tubes, drawing, W. Von Flotow and H. Leidig, Dantzic, Prussia, Germany.

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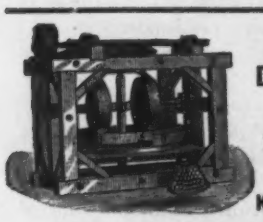

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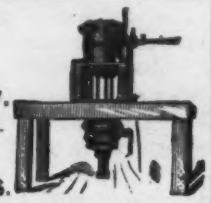

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Central Stamping Co.'s list.....dis 75

No	0	1	2	3	4	5	6	7	8
₱ doz.	$3 00	3 75	4 25	4 75	5 25	6 00	7 00	8 00	9 00

Fluting Scissors.

Discount.....45

Fluting Machines

Eagle 3¼-inch.....$2.15, dis 35
Geneva Hand Fluter. White Metal. ₱ doz. 12.00.....dis 25
Shepard hand. Nos. 85 $15.30. 95 $8. 110 $11 dis 40
Knox, 4½ inch rolls.....$3 25 each } dis 35
Knox, 6 inch rolls.....$3 60 each }
Crown, 4½ in. $3 50; 6-in. $4 00; 8-in. $6 50 each.....dis 35
Crown Jewel.....6-in. $3 50 each, dis 35
American. 5-in. $3; 6-in. $3 40; 7-in. $4 50 each.....dis 35
Crown hand fluter, Nos. 1 $15; 2, $12 50; 3, $10 ₱ doz.....dis 30

Gauges.

Marking.....dis 60&10
Wire.....dis 10&10

Gimlets.

Nail and Spike.....dis 50&10
Double Cut, low list.....25
"Bee".....₱ gross $12. dis 25

Glue Pots.

Tin enamele d.....dis 40@
Family. Handy.....dis 45

Grindstone Fixtures.

Sargent's.....dis70

Gun Wads.

U. M. C. & W. R. A.—B. E., 11up	2 00
U. M. C. & W. R. A.—B. E., 9&10	2 30
U. M. C. & W. R. A.—B. E., 7&8	2 60
U. M. C & W. R. A.—P. E., 11up	3 10
U. M. C. & W. R. A.—P. E., 9&10	4 00
U. M. C. & W. R. A.—P. E., 7&8	4 90
Eley's B. E., 11 up	2 00
Eley's P. E., 11@20	2 80

dis 20&2

Hack Saws.

Griffin's Hack Saws, complete.....dis 40
Griffin's Hack Saw. Blades only.....dis 40
Diamond Hack Saws and Blades.....dis 25

Halters.

Jute horse and cattle ties.....$13.50 gro. net.

Hammers.

Maydole's.....discount 25@25&10
Atha new list, Jan 15, 1887.....dis 40&10@50
Magnetic Tack. No. 1, 2, 3, $1.25, $1.50 and $1.75, dis 30
Heavy hammers and sledges under 5 lbs, 36c, over 5lbs, 30 c.....dis 70

Hand Cuffs and Leg Irons.

Providence Tool Co., hand cuffs. $15 ₱ doz...dis 10
Providence Tool Co., leg irons $25 ₱ doz.....dis 10
Tower's.....dis 15

Handles—

Door or Thumb Latches.

Per doz Nos.	0	1	2	3	4	
Sargent's	90	1 00	1 18	1 35	1 50	dis 60&10

Roggin's Latches.....₱ doz. 30@35c
Bronze Iron Drop Latches.....₱ doz. 70c net
Jap'd store door handles—Nuts. $1 62; Plate $1 10; no plate $0 88.....net
Barn doors.....₱ doz $1 80, dis 25
Wrought chest.....dis 50&10&10
Surface chest.....dis 70
Flush chest.....dis 70
Lifting.....dis 70
Saw and plane.....dis40&10
Hammer and hatchet.....dis 25&5&2
Brad awl.....₱ gross $2
Hickory firmer chisel, assort.....₱ gross $4 50
Hickory firmer chisel, large.....₱ gross $5 00
Apple firmer chisel, assorted.....₱ gross $5 00
Apple firmer chisel, large.....₱ gross $6 00
Socket firmer chisel, assorted.....₱ gross $3 00
Socket framing chisel, assort.....₱ gross $5 00
} dis 40
File. assorted.....₱ gross $2 75
Auger, assorted.....₱ gross $5 00 } 25
Auger, large.....₱ gross $7 00

Hangers.

Barn Door. old patterns.....dis 60&10 &10
Climax (Anti-Friction).....dis 55
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Scranton.....dis 25
Kidder's.....dis 50&10
Terry's Patent. 5 in.. 12.00; 3½ in., 10.00, dis 50
Paragon.....dis 40
Richards.....dis 20&10&10

Harness Snaps

German, new list.....dis 40&10
Covert, New Patent, new list.....dis 40&5&2

Hay Knives.

Lightning.....per doz. $11.50 net
Electric.....₱ doz $17.00 dis 30

Hinges.

Wrought Strap and T Hinges.....65&10&2@70&10
Screw, hook and strap, 8 10 12 in.....3½@4
" to 36 in.....2¼@3
Screw hook & eye hinges...½ ₱ doz 1.50
⅝ 2.45 } ...dis 10
¾ 3.80
Gate, western.....₱ doz $4 40. dis 55
Gate, N. E.....₱ doz $7 00, dis 55
Gate. N. E. reversible.....₱ doz $5 2), dis 55&15
Gate. Clark's. Nos. 1. 2. 3.....dis60&10@60&10&10
Gate. N. Y. State.....₱ doz $5 00. dis 55&15
Gate, automatic.....₱ doz $12 50. dis 50
Gate, common sense.....₱ doz pair $4 50, dis 50
Gate, Shepard's.....dis 60&1

Hollow-Ware.

Stove Hollow-Ware. Ground dis.....60&10&10
" " Undground.....70&10
Enameled Kettles.....dis 70
Saucepans.....dis 40
Galvanized Tea-Kettles

Inch	6	7	8	9
Each	55	60	65	75

Hoes.

Garden, mortar.....dis 65&5
Planter's. cot.....dis 65&5
Canton.....dis 65&5

Hog Rings and Ringers.

Hill's rings.....$2 50
" ringers.....{Old Style $3 00 / Improved $4 50}
Blair hog ringers.....₱ doz $3.00

Hooks.

Bird Cage. Sargent's list.....dis 60&10&10
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Clothes Line Sargent's list.....di 60&10
Ceiling Sargent's list.....dis 55&10
Coat and Hat. Sargent's list.....dis 55&10
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Hooks and Eyes—Brass.....dis 60&10&10

Horse Nails.

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Ausable. ₱ lb	23	24	25	26	28	dis25&10to25&10&10
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Burden.....₱ keg $4.25
R. I. Horse Shoe Co., Perkins' Imp. at factory.....₱ keg $4 25
Mule Shoes, at factory.....₱ keg $5.25

Hose, Rubber, Boston Belting Co's.

Standard.....70
Extra.....55&10
Best.....45&10

Ice Picks, Chisels, &c.

Am. Ice Chisel Pol'd.....₱ doz. $3.00. dis20

Ice Cream Freezers.

American.....50&10
Gem.....55&10
Crown.....50&10

Ice Tongs.

Champion.....₱ doz $4.00. dis 25&10
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Jack Screws.

Illinois Bolt Co. list.....dis 70

Kettles.

Brass. 7 to 17 inches inclusive.....₱ lb 22c. net.
Brass larger than 17 inches.....₱ lb 24c.
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Keys.

Eagle. cabinet, trunk and padlock...dis 33⅓ and

Knives.

Russell's Butcher.....net
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Carriage, Japanned.....₱ gross 80c. dis 60&10
Base, Rubber Tip.....dis 70&10&5
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Door Por. Jap'd.....90c
Door Por. Por.....3 00@3 25
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Bell pulls, genuine bronze....dis 60
Lever bell pulls, genuine bronze....dis 60&10
Butts, genuine bronze....dis 60&10
Butts, bronze plated....dis 60&10
Store door locks and latches....dis 60&10
Store door handles....dis 60&10
Shutter hinges & flaps genuine bronze....dis 60&10
Shutter hinges, bronze plated....dis 70
Flush bolts, genuine bronze....dis 70
Shutter knobs, genuine bronze....dis 50
Shutter bars, genuine bronze....dis 60
Sash lifts, genuine bronze....dis 60
Sash pulls and plates, genuine bronze....dis 60
Push plates, genuine bronze....dis 60
Drawer pull genuine bronze....dis 66⅔
Letter box plates, genuine bronze....dis 60&10
Barn door locks....dis 33⅓

Lemon Squeezers.

Porcelain lined....₱ doz $6 00, dis 25&35
Wood....₱ doz $3 00. dis 55
The "Boss"....₱ doz $2.50
Dean's No. 1. ₱ doz $6 50: 2, $3 25; 3, $1 90....dis
Little giant....dis 50

Lines.

Cotton Chalk....dis 40
Silver Lake, Braided, No. 0, $6.00; No. 1. $6.50; No. 2, $7.00; No. 3, $7.50 ₱ gross....dis 25
Masons' Linen....dis 40
Wire Clothes, No 18, $3.75; No 19, $3.25; No. 20 $2.75;....

Mallets.

Hickory....dis 20&10
Lignumvitæ....dis 20&10
Penfield Block Co., Lignumvitæ and Hickory....dis 30

Mattocks.

Regular list....dis 60@60&5

Meat Cutters.

Dixon's (P.S.&W.)	1	2	3	4
	₱ doz.	$14.00	$17.00	$19.00	$30.00

dis 45

Draw Cut Nos.	5	2	6	8	10
Each	$50.00	$75.00	$80.00	$225.00	400.00

dis 20@25

Woodruff's (P S & W) per doz No 100 $15 No 150 $18dis 45

Hale's—Nos. 11 12 13 $27 $33 $45 dis 70

Enterprise....dis 33⅓

Mincing Knives.

Am. (2d quality), ₱ gro, 1 blade, $7; 2 blades, $12; 3 blades, $18....net
Smith's, ₱ doz. single, $4 50; double, $6 50 dis 40

Money Drawers.

Tucker's ₱ doz....$18 @20

Molasses Gates.

Stebbins' pat....dis 70
Stebbins' genuine....dis 66⅔&10
Stebbins' tinned ends....dis 40&10
Lincoln's pattern....dis 66⅔&10
Scoville....$7 45&10

Nails (wire).

List July 14 1887....dis 70
Standard Penny Nails, ₱ keg card rate
{ Car lots....$2 55
{ Less than car lots, $2 65

Nuts and Washers.

Size of bolt in	¼	5-16	⅜	½	⅝	¾	1
Square	8¼	7	5½	4¼	4	3½	3⅛
Hexagon	15⅓	11½	8⅓	6	5¾	5¼	5
Washers	9	8	7	5	4⅓	4⅓	4⅓

In lots less than 100 lbs, ₱ lb add ½c, 1lb boxes add 1c to list

Nut Crackers.

Table (Humason & Beckley Mfg. Co.)....dis 40
Blake's pattern....₱ doz. $2 00, dis 10
Quakenbush....$5 00 net

Oakum.

Government....₱ lb 8 c
U. S. Navy....₱ lb 7¼c
Navy....₱ lb 6½c

Oilers.

Zinc and Tin....new list dis 60&10
Brass and Copper....new list dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₱ doz....dis 10@ 10&10

Packing, Steam.

Boston Belting Co....dis 60
American Packing....10@11c
Russia Packing....16c
Italian Packing....16c

Pencils.

Faber's Carpenters'....high list, dis 50
Faber's Round Gilt....₱ gro $5.25 net

Picks.

Railroad, 5 to 6 lbs....$12 dis 60@60&5
" " 6 to 7 lbs....$13 dis 60@60&5

Pinking Irons.

₱ doz....65c. net

Picture Nails.

Brass head, Sargent's list.... } dis 50&10&10
Brass head, combination list....dis 50&10
Porcelain head Sargent's list, dis....50&10&10
Porcelain head, combination list....dis 40&10

Plane Irons.

Sandusky Tool C....dis 20&10

Pliers and Nippers.

Button's Patent....dis 40
Hall's Pat. Compound Lever Cutting Nippers, No. 2, 5 in., $13.50; No. 4, 7 in., $21 00 ₱ Doz....dis 20&10@33⅓
Gas Pliers....dis 50&10
Humason & Beckley....dis 50
P. S. & W. Tinners' Cutting Nippers add 6 per cent. dis 10

Plumbs and Levels.

Standard list....dis 70&10
Pocket levels....dis 70&10
Davis' inclinometers....dis 10&10

Post Hole and Tree Augers.

Samson Post Hole Digger..₱ doz. $36.00, dis 20&10
Eureka Diggers....₱ doz. $15.00 @ $16.00
Champion....per doz $9.00
Vaughan's Hollow Tube Post Hole....$12.00 dis40

Potato Parers.

White Mountain....₱ doz $5.00@$5.50
Antrim Combination....₱ doz $8.00
Hoosier....₱ doz $13.50

Pruning Hooks and Shears.

Disston's Combined Pruning Hook and Saw ₱ doz $18.00....dis 25
Disston's Pruning Hook....₱ doz $12.00 dis 25
Pruning Shears....₱ doz 3.75@$4.00 net

Pulleys.

Hot House....discount 60&10
Japanned Screw....discount 60&10
Brass Screw....discount 60&10
Japanned Side....discount 60&10
Japanned Clothes Line....discount 60&10

Pumps.

Cistern, best makers....dis 50@10&60
Pitcher spout, best makers...dis 60&10@60&10&10
Pitcher spout, cheaper goods... dis 70&5@70&10&5

Punches.

Saddlers' or Drive....₱ doz. good quality. 65@75c
Bemis & Call Co.'s Cast Steel Drive....dis 50&5
Bemis & Call Co.'s Springfield Socket....dis 50&5
Solid Tinners....₱ doz. $1.44, dis 55

Rails.

Sliding Door, Wrought Brass....₱ lb 35c dis 20
Sliding Door, Iron, Painted... ₱ foot 6c dis 40&10

Rakes.

Cast Steel....dis 65&5
Malleable....dis 65&5

Razors.

J. R. Torrey Razor Co....dis 20
Wostenholme & Butcher....$10 @ £....dis 10
Rifle Razor....$9 50 net

Rivets.

Iron, Thousand, list November 17....dis 50
Iron, Ordinary, Cooper's Block and Carriage, list November 17....dis 50
Copper....dis 50

Rods.

Stair, Brass....dis 25&2

Rollers.

Barn door, Sargent's list,.... dis 60&10&10
Acme (Anti-Friction)....dis 55

Rope.

Manilla, ½ inch and over....11½c
Sisal, ½ inch and over....11c

Rules.

Boxwood....discount 80@80&10

Sad Iron.

From 4 to 10 lbs....per 100 lbs 3c
Self-heating....₱ doz $9 net
Self-Heating, Tailor's....₱ doz $18 net
Mrs. Potts's Irons,....dis 40&10
Enterprise Star Irons....discount 40&10

Sash Weights.

Per ton....$22.50@$25.00

Saws.

Disston's Circular....discount 45
Disston's hand panel, rip &c....discount 25
W. M. & C., Champion Regular....per foot 23c
W. M. & C., " Thin Back....₱ ft 24c

Saw Frames.

White, Vermont....₱ gross $12 00
Red, polished & varnished ₱ doz $1.50, ...dis 25

Saw Sets.

Aiken's Genuine....$13.00, dis 50 &10
Morrill Saw Sets No. 1 $15.00; No. 3 and 4 $24.00 .....dis 40 &10

Scales.

Hatch, Counter, No. 171....₱ doz $21.00
Hatch, Tea, No. 161....₱ doz $6.75@7.00
Chatillon's Grocers....dis 50
Family Turnbulls....dis 30@30&10
Scale Beams, List of January 12, 1882 dis 50&10

Scrapers.

Adjustable Box Scraper (S. R. & L. Co.) $6.50....dis 30&10
Box, 1 Handle....₱ doz $4.00, dis 10
Foot....dis 50&10

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles dis 65&10
Stanley R. & L. Co.'s Black Handles....dis 60&10
Sets Interchangeable....₱ doz $18.00 dis 25

Screws.

Wood Screws—List Jan 27, 1881.

Flat head iron....dis 70 } Extra ....10 often given
Round head iron....dis 65
Flat head brass....dis 65
Round head brass....dis 60
Flat head bronze....65
Round head bronze....60
Machine, flat head, iron....dis 55
Machine, round head, iron....50
Bench and hand—
Bench, iron....25&10
Bench, wood, beech, per dozen $2.25....
Bench, wood, hickory....20 & 10
Hand, wood....20&10
Lag or coach....dis 66⅔@70
Coach, patent gimlet point....66⅔@66⅔&5
Bed....25&5
Hand rail,....66⅔&10

Saw Tools.

Atkins' patent....₱ doz sets $6 00

Shears.

American (Cast) Iron....dis 75&10
Pruning....See Pruning Hooks and Shears
Garnard's Lamp Trimmers....₱ doz $4.00
Tinners'....dis 20&2
Seymours List, Dec. 1881....dis 60 &10&5
Seymours Tailor's Shears....dis 33⅓

Scroll Saws.

Lester, complete, $10.00....dis 25
Rogers, complete, $4.00....dis 25

Sheaves.

Sliding Door R. & E. list Dec 18, 1885.... dis 55&2
Sliding Door, Patent Roller....dis 60&10&2
Sliding Door, Pat'nt Roller, Hatfield's....dis 70
Sliding Door, Corbin's Anti-Friction Dec. 18, 1885 dis 60&2

Ship Tools.

L. & I. J. White....dis 20 & 5

Shovels and Tongs.

Iron Head....50&10&5
Brass Head....50

Sieves.

Metallic, new list....dis 60&10
Flour sifters { Victor....$2 00
Flour sifters { Hunter....$2 25
Flour sifters { Comet....$1 25

Slates.

School, by case....dis 50&5@50&10

Spoke Shaves.

Iron....dis 30
Wood....dis 30

Spoke Trimmers.

Bonney's....₱ doz $10.00 dis 50
Stearns'....₱ doz $9.00 dis 20&10

Spoons.

Basting Spoons....dis 70&10
Britannia....dis 50
Rogers Bros....dis 50&10

Squares.

Steel and iron } dis 70@10&75
Nickel plated }
Disston's try square and T bevels.... dis 45
Winterbottom's try and miter....dis 30&10

Steelyards.

dis 40&10@50

Stocks and Dies.

Blacksmith's....dis 35
"Lightining" screw plate....dis 15

Stone.

Hindostan, No. 1, 6c; Axe, 4½c; Slips 9c
Washita Stone....No. 1, ₱ lb 20
Turkey Oil Stone....4 to 8 in....₱ lb
Turkey Slips....$1.00@1.50
Washita Slips No 1....₱ lb 37@38
Washita No 2 stone....₱ lb 15c
Arkansas Stone....2.00

Stove Boards.

Zinc....70
Oxidized....45

Shovels and Spades.

Ames' list Nov 1 1885....discount 20
Dennis....5.50
Hussey & Binns, rail road....6.00

Stove Polish.

Joseph Dixon's....₱ gross $6 00 dis 10
Gem....₱ gross 4 50 dis 10
Gold medal....₱ gross 6 00 dis 25
Rising Sun....₱ gross $5 50 net
Dixon's plumbago....₱ lb 8c. net

Trowels.

Lothrops' Brick and Plastering....dis 25
Reed's Brick and Plastering....dis 25
Disston's Brick and Plastering....dis 20
Brade's brick....dis 20

Tacks, Brads, &c.

New List, September 1. 1882. & Supplement Jan-1, 1886.

American iron carpet tacks all kinds dis..72½&10
Steel carpet tacks all kinds....72½@10
Swedes Iron carpet tacks all kinds....72½&10
Swedes iron tacks....67½&10
Swedes iron Upholsterers' tacks....67½&10
Tinned Swedes iron tacks....67½&10
inned Swedes iron Upholsterers' tacks....67½&10
American iron cut tacks....70&10
Copper tacks....33⅓&10
Copper finishing and trunk nails....33⅓&10
Cigar box nails....45&10
Finishing nails....60&10
Hungarian nails and miners' tacks....60&10
Gimp and lace tacks....67½&10
" " " tinned....67½&10
Trunk and clout nails....60&10
Tinned trunk and clout nails....60&10
Basket nails....60&10
Chair nails....60&10
Common and patent brads....60&10
Tinned capped trunk nails....60&10

Tinware.

Stamped, Japaned & Pieced. list Jan 20, 1887.... ....dis 70&10

Tobacco Cutters.

Enterprise Mfg. Co (Champion)....dis 20&10@30

Traps.

Game, Newhouse....dis 35
Victor....60&10
Wood, mouse....15c ₱ doz holes
Delusion, mouse....₱ gross $18 00 dis 15

Transom Lifters.

Wollensak's Patent....dis 50

Twine.

	BC.	P.
No. 12, Flax Twine, ¼ and ½ lb Balls	21½c	27c
No. 18, " " ¼ and ½ "	21½c	27c
No. 36, " " ¼ and ½ "	20c	25c
2-Ply Hemp, ¼ and ½ lb Balls (Spring Twine)	17	
3-Ply " 1 lb Balls	17½c	
3-Ply " 1½ lb Balls	16c	
Cotton Wrapping, 5 Balls to lb	15@16c	

Vises.

Solid box....50&10&5@60
Parker's....discount 20@25
Prentiss...." 20 &5@25
Stephen's...." 25
Saw Filers, Wentworth's....dis 20&10
Saw filers, Stearn's....33⅓&10

Washer Cutters.

Smith's Patent....₱ doz $12 00, dis 20&10&10
Johnson's....₱ doz $11 00, dis 33⅓
Penny's....₱ doz Pol. $14 00; Jap'd. $16 00, dis 55
Appleton's....₱ doz $16 00, dis 60&10
Bonney's....dis 30&10

Well Wheels.

8 in., $2.00; 10 in., $2.50; 12 in., $3.25

Wire. New List Jan. 18. 1884

Brass and Copper....discount 20
Bright and annealed, Nos. 0 @18 ... dis 70&5@72½
" " Nos. 19 @ 26....dis 72½@75
" " Nos. 27 @ 36 dis 75@75&10
Coppered Nos. 0 to 18, market list....dis 65&10@70
Galvanized Nos. 0 to 18 " " dis 60&7½@65
Tinned market Nos. 0 to 18,....dis 65
Cast steel....dis 50
Tinned Broom Wire....dis 70@72½
Annealed Fence, Nos. 8 and 9....dis 75
Annealed Grape, Nos. 10 to 14....dis 75
Stubs Steel Wire regular....$6 00.@lb dis 30

Wrenches.

Coe's genuine. cash in 10 days....55 & 3
Girard Standard....discount 70&10
Agricultural....discount 75&10
Mechanics'....dis 55&10 & 3
Bemis & Call's Combination....25&10
Donohue's Engeneers'....25

TINNERS' STOCK.

Tin.

Banca....25
Straits....24½
English....24½
Bar....26

Spelter.

American, cash, ₱ lb....

Charcoal Tin Plate.

IC 12x12 225 sheets....$6 00@6 50
IX 14x20 112 sheets....7 25@8 00
IC 10x14 225 sheets....₱ box 5 75@6 25
IC 20x28 112 sheets....12 25@14 00
IX 10x14 225 sheets....7 25@8 00
IX 12x12 225 sheets....7 75@8 25
For each additional X add $1.00@3.00

Coke Tin Plate.

	Best	Ordinary
IC 10x14 } IC 14x20 }	$5 60	

Solder.

Half and Half, in bars warranted } Quotations only application.
No. 1, Refined }
Bingham }

Zinc.

In cask....6¼
In open....7

LEAD.

Pig....
Bar....₱ lb.... } No quotations. Market excited and declining.
Sheet....₱ lb....
Shot....₱ bag 25 lbs....

BABBIT METAL.

No. 4....6
Allens....9¼
Excelsior....15
W. B. Genuine....25

COPPER.

Lake Ingot....17¼
Arizona....16¾

IRON AND STEEL.

Flat Bar

1¼ to 4 by ⅜ to 1 inch....1 85
4½ to 6 by ⅜ to 1 inch....1 95
1¼ to 6 by 1⅛ to ¼ inch....2 25
1¼ &1⅝ by ⅜ to 1 95
1 &1⅛ by ⅜ to ⅝....1 95
⅝, ¾ and ⅞ by ⅜ to ⅝....2 35

Round and Square.

1 to 1⅛ inch....1 85
2 to 2¾....2 05
2¾ to 3¼ inches....2 35
3⅜ to 4....2 85
4¼ to 4½....3 35
4¾ to 5....3 55

Oval.

⅜ to 1¼ inch....2 25
⅝ to ¾....2 45
⅞....2 65
¾....3 05

Half Oval and Half Round.

1¼ to 3 inch....2 95
⅜ to 1¼....2 55
⅞ to ¾....3 05
⅞....3 35
¾....4 85

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch....2 0
1 to 1⅝ by ¼ and 5-16 inch....2 15
¾ to ⅞ by ¼ and 5-16 inch....2 35
½ to ⅝ by ¼ and 5-16 inch....2 85

Hoops.

1¼ to 4, Nos. 13 to 15....2 65
1½ to 2, Nos. 16 to 18....2 75
1¼ to 2, No. 19....2 85
1¼ to 2, No. 20....2 95
1¼ to 2, No. 21....3 05
1¼ to 2, No. 22....3 15
15-16, 1 and 1¼, Nos. 13 to 15....2 85
15-16, 1 and 1⅛, Nos. 18 to 18....2 95
15-16, 1 and 1⅛, Nos. 19 and 20....3 05
15-16, 1 and 1⅛, No. 21....3 15
15-16, 1 and 1⅛, No. 22....3 35
¾, Nos. 13 to 15....3 05
¾, Nos. 16 to 18....3 15
¾, Nos, 9 and 20....3 55
¾, No. 21....3 65
¾, No. 22....3 75
11-16, Nos, 13 to 15....3 55
11-16, Nos. 16 to 18....3 65
11-16, Nos. 19 and 20....3 75
11-16, No. 21....3 85
11-16, No, 22....3 95
⅝, Nos. 13 to 15....3 85
⅝, Nos. 16 to 18....3 95
⅝, Nos. 19 and 20....4 05
⅝, No. 21....4 15
⅝, No 22....4 25
⅝, No. 23....4 35

Light Band

1¼ to 6 by ¼ to 3-16 in....2 35
1½ to 6 by Nos. 11 and 12....2 45
1 to 1⅝ by ⅛ to 3-16 in....2 45
1 to 1¾ by Nos. 11 and 12....2 55
⅞ and 13-16 by ⅛ to 3-16 in....2 75
⅞ and 13-16 by Nos. 11 and 12....2 85
¾ and 11-16 by ⅛ to 3-16 in....3 05
¾ and 11-16 by Nos. 11 and 12....3 15
⅝ and 9-16 by ⅛ to 3-16 in....3 35
⅝ and 9-16 by Nos. 11 and 12....3 40
½ by ⅛ to 3-16 in....3 60
½ by Nos. 11 a d 12....3 70

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12....2 85
⅞ inch, " " " " 13 and 14....3 15
¾ inch, " " " " 11 and 12....3 15
¾ inch, " " " " 13 and 14....3 35

Sheet Iron.

No. 13 to 4....2 55
No. 15 to 17....2 75
No. 18 to 21....2 85
No. 22 to 24....2 95
No. 25 to 26....3 05
No. 27....3 15
No. 28....3 35

Iron Boiler Plates.

Tank, ¼ inch and heavier....2 45
C No. 1, " 2 70
C H No. 1, " 2 95
C H Flange, " 3 65
Extra Flange, " 4 05
Solid Fire Box, " 4 95

Steel Boiler Plates—1-4 in. and heavier.

Tank....$2 55
Shell....$3 05
Flange....$3 30
Marine Flange....$3 80
Fire Box....$4 45
Above includes plates 90 inches wide.
90 to 96 in. wide....½c. ₱ lb extra.
96 to 100 in. wide....1 c. "
100 to 104 in. wide....1½c. "
104 to 116 in. wide....special.

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON. cts. ₱ lb

to 2 in. inclusive....09
9-16 to ½ in. " 09
7-16 to ⅝ and 2⅛ to 3 in....10¼
3⅛ to 4 in....10
⅝ to 11-16 an 4⅛....11¼

TRAVELER'S REGISTER.

Standard Time.
Revised March 6th, 1888.

N. Y. C. & St. L. R. R. Co.—"The Nickel Plate."

EASTWARD.	ARRIVE.	DEPART
Buffalo Passenger	10 40 a m	10 45 a m
Chicago Passenger	9 20 p m	
Local Freight	4 40 p m	5 45 a m
WESTWARD.	ARRIVE.	DEPART.
Chicago Passenger		6 30 a m
Fostoria Passenger	4 46 p m	4 51 p m
Local Freight	5 20 p m	5 50 a m

Rocky River Accommodation departs 7:40 a. m.; 1:40 p. m.

Euclid Accommodation departs 6:24 a. m. 12:10 a. m., 5:05 p. m.

All trains daily, except Sunday.

Cleveland & Pittsburg.

	ARRIVE.	DEPART.
New York Express	12 45 p m	7 45 a m
New York Express	6 55 p m	1 40 p m
Alliance & Akron Accom.	9 35 a m	5 25 p m
Ravenna Accommodation	8 25 a m	5 00 p m
Night Express	* 5 25 a m	*11 10 p m

*Daily; all other trains daily except Sunday.

Mt. Vernon & Pan Handle Route

C., A. & C. Ry. Co.	ARRIVE.	DEPART.
Akron, Col. & Cin. "Flyer"	5 40 p m	8 10 a m
Akron, Col. & Cin. Night Express	7 30 a m	8 00 p m
Akron & Columbus Exp	12 45 p m	1 40 p m
Akron & Orrville Accom	9 35 a m	3 25 p m

The 8 p. m. train runs daily. Elegant Pullman palace sleeping cars attached. All other trains daily except Sunday.

Erie Railway.
Depot, South Water St. and Viaduct.

	ARRIVE.	DEPART.
N. Y. & Pitts. Express	15 58 a m	*8 25 a m
Fast N. Y. & Pitts. Express	*10 55 a m	*3 00 p m
Mahoning Accommodation		†6 40 a m
Pittsburgh Express	† 6 25 p m	
Youngstown Local	†8 05 a m	
Mahoning div. and Pitts Local		*11 40 a m
Mahoning Val Accom		*4 30 p m
Pittsburgh Express	†1 20 p m	11 10 p m
New York Express	*8 00 p m	

* Daily. † Daily except Sunday. ‡ Daily except Monday.

Lake Shore & Michigan Southern Railroad.

TRAINS GOING EAST.	Arrive from West.	Depart East.
No. 4, Fast Limited Ex	2 55 a m	*2 55 a m
No. 6, N. Y. & Bos. Ex	*1 35 a m	*1 40 a m
No. 8, N. Y. B't'o & At Ex	*8 25 a m	*8 50 a m
No. 26, Elyria Accom	†7 45 a m	
No. 10, Toledo & Sandusky Accommodation	†1 05 a m	
No. 24, Buffalo Accom		†7 00 a m
No. 10, N. Y. & Boston "Flyer,"		*11 50 a m
No. 12, N. Y. & Bos. Ex.	*2 35 p m	*3 00 p m
No. 2, Night Express	†9 40 p m	†10 00 p m
No 28, Conneaut Accom		†4 25 p m

TRAINS GOING WEST.	Arrive from East.	Depart West.
No. 1, Fast Limited Ex	*12 15 a m	*12 15 a m
No. 23, Cleveland Express	*2 15 a m	
No. 3, Chi. Ex. via Sand'y	15 30 a m	†5 45 a m
No. 25, Mich. Ac. via Norw'k		†5 45 a m
No. 21, Toledo Ex. via Norwalk and Sandusky	†12 50 p m	†3 20 p m
No. 5, Fast St. Louis & Chicago Ex. via Sandusky	*10 50 a m	*10 55 a m
No. 9, hi. Pac. Ex. via Nor'k	*6 55 p m	*7 15 p m
No. 31, Elyria Accommodation, to Elyria only		†4 30 p m
No. 27, Conneaut Accom	†8 10 a m	

Sunday train for Nottingham—Depart 8:15 a. m. and 1:00 p. m.; arrive 9:20 a. m. and 4:45 p. m.

Reference marks—*Daily. †Daily except Sunday. ‡Daily except Monday.

A local Cleveland and New York Sleeper and dining car daily on No. 10, leaving Cleveland at 11:50 a. m., arrives Grand Central Depot, New York 7:30 a. m.

For further information as to trains, connections and sleeping car berths apply at the City Ticket Office 259 Bank St., Mercantile Bank building. Telephone 669.

M. E. GAUL, City Pass. Ag't. A. J. SMITH, Gen'l Pass. & Ticket Ag't.

Cleveland and Canton Railroad.

Arrive.—Canton, Sherrodsville and Coshocton 9 55 a.m., 7 00 p.m.
Kent—*7 50 a.m., *7 16 p.m.
Bedford—*7:50 a.m., 1:05 p.m., 7 16 p.m.
Newburgh and Miles avenue—7:10 a.m., 4:15, p.m. 5:33 p.m.
Depart—
Canton, Sher'dsville & Cosh't'n—7:00 a.m. and 3:10 p.m.
Kent—*8:38 a.m. and *8:36 p.m.
Bedford—*8:38 a.m., 4:45 p.m., 11:10 a.m., 5:45 p.m.
Newburgh and Miles Avenue—6:12 a.m., 2:00 p.m., 4:40 p.m.

Trains marked with * run daily. All others daily except Sunday.

Depot at Ontario street, one block east of Huron street

Cleveland, Lorain and Wheeling.

	DEPART.	ARRIVE.
Wheeling Express	6 45 a m	6 55 p m
Uhrichsville Express	4 00 p m	9 20 a m

Pittsburgh & Lake Erie Railroad.

On and after Jan. 2, 1888, passenger trains will depart from and arrive at the Pittsburgh and Lake Erie Depot at Pittsburgh, as follows, Central time:

P. & L. E. R. R. Depart for—

No. 1, Cleveland, Bradford and East | 5 25 a.m
No. 5, Buffalo, St. Louis, Cleveland | 7 45 a.m
No. 3, Beaver Falls Accommodation | 8 40 a.m
No. 7, Buffalo, New York, and all New England points | 10 15 a.m
No. 9, Chicago, Cincinnati, St. Louis | 1 10 p.m
No. 11, Buffalo Express | 3 30 p.m
No. 13, Beaver Falls Accommodation | 5 20 p.m
No. 15, Buffalo Express | 10 30 p.m

Arrive from—

No. 2 Beaver Falls Accommodation | 5 25 a.m
No. 4, Buffalo and Cleveland Night Exp. | 6 55 a.m
No. 6, Youngstown Accommodation | 9 20 a.m
No 8 Beaver Falls Accommodation | 12 40 p.m
No. 10, Chicago, Cincinnati & St. Louis | 1 35 p.m
No. 12, Buffalo Express | 5 45 p.m
No. 14, Cincin., St. Louis and Cleveland | 8 05 p.m
No. 14, Cleveland & Buffalo Express | 10 35 p.m

Pittsburgh & Lake Erie trains Nos. 4, 15, 8 and 10 daily.

E. HOLBROOK, General Superintendent.
R. W. JONES, Master of Transportation.
D. SMITH, Gen'l Pass. Ag't, Pittsburgh.

WHEELING & LAKE ERIE

TIME TABLE—IN EFFECT JAN. 8, 1888.
Central Standard Time.

EASTWARD.	No. 5.	No. 7.	No. 9.*	No. 13*
Toledo lv	7 45 AM	1 10 PM	4 50 PM	7 45 PM
Oak Harbor ar	8 41	2 05	5 45	10 01
Fremont	9 06	2 30	6 10	10 45
Clyde	9 22	2 47	6	11 15
Bellevue	9 37	3 03	6 40	11 40 PM
Monroeville lv	9 55	3 20	6 58	3 10 AM
Norwalk	10 10	3 40	7 15	3 22
Wellington	11 00	4 32	8 08	4 00
Creston	11 53	5 20	9 05 PM	4 47
Orrville ar	12 20 PM	5 48	9 40 PM	5 15*
Orrville lv	12 40	5 53	7 05 AM	7 05
Massillon ar	1 20	6 35	7 52	7 52
Massillon lv	1 20	6 35	7 52	7 52
Navarre	1 35	6 50	8 10	8 10
Valley Junc. lv	2 20	7 35	8 55	8 55
New Cumberl'd	2 23	7 48	9 10	9 10
Sherrodsville	2 45	8 00	9 25	9 25
Leesville	2 52	8 08	9 40	9 40
Bowerston ar	2 58 PM	8 15 PM	9 50 AM	9 50 AM
Canal Dover	2 57 PM			
New Comerst'n	3 38			
Cambridge	4 35			
Macksburg	6 02			
Marietta ar	7 15 PM			

WESTWARD.	No. 6.	No. 8.	No. 4.	No. 2.*
Marietta lv	6 45 AM	2 20 PM		
Macksburg	7 56	1 30		
Cambridge	9 25	3 00		
New Comerst'n	10 23	3 58		
Canal Dover	11 04 AM	4 38 PM		
Bowerston	1 25 AM	3 45 PM	5 55 AM	
Leesville	11 32	3 55	6 02	
Sherrodsville	11 40	4 10	6 10	
New Cumberl'd	11 52	4 25	6 22	
Valley Junc	12 20 PM	5 02	6 45	
Navarre	12 50	5 35	7 35	
Massillon	1 05	5 50	8 00	
Orrville ar	1 40	6 25	8 55	
Orrville lv	1 45	6 38*	9 13	
Creston lv	2 18	7 02	9 42	
Wellington	3 05	7 43	10 33	
Norwalk	3 55	8 25	11 30	7 25 AM
Monroeville	4 07	8 35	11 45	7 35
Bellevue	4 23	9 45	11 59	7 51
Clyde	4 39	10 00	12 15 PM	8 06
Fremont	4 55	10 17	12 30	8 23
Oak Harbor	5 20		12 53	8 45
Toledo ar	6 20 PM	11 15*	1 50 PM	9 40 AM

No. 27	No. 25	Huron Divis'n.	No. 26	No. 28
4 50 PM	7 40 AM	Ar. Huron Lv	8 55 AM	5 30 PM
4 32	7 22	Friese Landing	9 10	5 45
4 20	7 10	Milan	9 28	6 03
Lv 3 55	Lv 6 45	Norwalk	Ar 9 55	Ar 6 30
Ar PM	Ar AM		Lv AM	Lv AM
		Monroeville		

* Daily.

Train No. 13 leaves Toledo *7 45 p. m.; arrive Monroeville 12 15 a. m. and Norwalk 12 35 a. m.

This road is now open through from Toledo to Bowerston, connecting with the Pennsylvania System for all points East.

THROUGH CAR SERVICE.

Between Toledo, Cambridge and Marietta.
" " and Bowerston.
" " and Akron, Youngstown and Pittsburgh.
" Chicago, Akron, Youngstown and Pittsburgh.

M. D. WOODFORD, Gen'l Manager. JAMES M. HALL, Gen'l Pass. Agt.

Scioto Valley Railway

TIME TABLE.
In effect May 27, 1888.
THE SHORT LINE TO ALL POINTS
North and South, East and Southeast, West and Northwest.

TRAINS GOING SOUTH

STATIONS.	No. 2.	No. 4.	No. 6.
Columbus Lv	7 10 a.m	11 25 a.m	5 25 p.m
Valley Crossing	7 30 "	11 44 "	5 45 "
Lockbourne	7 41 "	11 53 "	5 56 "
Ashville	7 55 "	12 07 p.m	6 10 "
Circleville	8 15 "	12 26 "	6 30 "
Kingston	8 34 "	12 44 "	6 49 "
Chillicothe	9 01 "	1 30 "	7 35 "
Sharon	9 36 "	2 05 "	8 10 "
Waverly	9 46 "	2 14 "	8 20 "
Piketon	9 58 "	2 27 "	8 33 "
Big Run	10 12 "	2 41 "	8 47 "
Lucasville	10 27 "	2 57 "	9 03 "
Portsmouth	10 50 "	3 20 "	9 25 "
Sciotoville	11 05 "	3 35 "	9 40 "
Wheelersburg	11 10 "	3 40 "	9 45 "
Havernill	11 29 "	3 59 "	10 04 "
Hanging Rock	11 40 "	4 10 "	10 15 "
Ironton	11 50 "	4 20 "	10 25 "
Petersburg	12 00 m.	4 30 "	10 35 "
Ashland Ar	12 30 p.m	5 00 p.m	11 05 p.m

Trains Nos. 2 and 4 daily, except Sunday.
Train No. 6 daily.
Train No. 6 takes supper at Chillicothe.

TRAINS GOING NORTH.

STATIONS.	No. 1.	No. 3.	No. 5.
Ashland Lv	2 45 a.m	9 05 a.m	5 35 p.m
Petersburg	3 15 "	9 35 "	6 05 "
Ironton	3 26 "	9 46 "	6 15 "
Hanging Rock	3 36 "	9 56 "	6 25 "
Havernill	3 46 "	10 07 "	6 36 "
Wheelersburg	4 06 "	10 28 "	6 55 "
Sciotoville	4 12 "	10 33 "	7 00 "
Portsmouth	4 27 "	10 05 "	7 15 "
Lucasville	4 49 "	11 14 "	7 37 "
Big Run	5 04 "	11 32 "	7 53 "
Piketon	5 18 "	11 48 "	8 07 "
Waverly	5 30 "	12 01 p.m	8 20 "
Sharon	5 40 "	12 11 "	8 30 "
Chillicothe	6 35 "	1 10 "	9 06 "
Kingston	7 01 "	1 26 "	9 31 "
Circleville	7 20 "	1 36 "	9 49 "
Ashville	7 40 "	1 55 "	10 08 "
Lockbourne	7 55 "	2 15 "	10 22 "
Valley Crossing	8 06 "	2 39 "	10 31 "
Columbus Ar	8 20 a.m	3 00 p.m	10 50 p.m

Train No. 1 daily.
Trains Nos. 3 and 5 daily, except Sunday.

COUPON TICKETS, by the best routes and to all principal points in the United States and Canada, can be found at the following Stations: Columbus, Circleville, Kingston, Chillicothe Waverly, Portsmouth, Ironton, A. C. & I. Ashland.

For further information relative to rates, connections and through time, call on your Ticket Agent, or address J. ROBINSON, Receiver.
JNO. J. ARCHER, Gen'l Pass. & Ticket Ag't, Columbus, Ohio.

Ft. Wayne, Cincinnati & Louisville RAILROAD.

THE POPULAR ROUTE
BETWEEN THE
NORTH and SOUTH

THE DIRECT ROUTE TO OR FROM
FORT WAYNE,
INDIANAPOLIS,
TERRE HAUTE,
EVANSVILLE,
AND ST. LOUIS.

13 MILES SHORTER —BETWEEN— **13**
Fort Wayne and Indianapolis
Than any other Route.

22 MILES SHORTER AND QUICKER **22**
By **3 HOURS**, Between
Louisville and Fort Wayne.

Ask for Tickets
—VIA—
Ft. Wayne, Cincinnati & Louisville Railroad.

For sale by all Agents of connecting lines.
EAST, WEST, NORTH AND SOUTH.

W. W. WORTHINGTON, Gen'l Supt. S. A. WIKEL, Gen'l Ticket Agent, FORT WAYNE, IND.

The Picturesque Lehigh Valley Route.

Two through trains with Pullman cars attached are now run via by this beautiful scenic route, between Suspension Bridge, Buffalo, New York and Philadelphia, leaving Suspension Bridge 8:35 A. M. and 3:40 P. M., Buffalo 9:15 A. M. and 5:15 P. M., connecting with all trains from the West.

Passengers between the East and West passing over the famed LEHIGH VALLEY ROAD will experience the pleasure of a trip through the most magnificent and picturesque scenery in the world, presenting an ever varying panorama of delightful surprises.

Double track, steel rails, magnificent road bed and unrivaled equipment, all combine to make the LEHIGH VALLEY the favorite and most desirable route between the East and the West.

Anthracite Coal is used entirely, guaranteeing the passengers perfect freedom from the dense volumes of smoke that so greatly annoy passengers on lines using Bituminous Coal.

E. B. BYINGTON, Gen'l Pass. Agent Bethlehem, Pa.

Expiration Registers.

MANUFACTURERS' and Dealers' Insurance Registers with special ruling for number of Policy, Company, seven spaces for amounts on different property, amount of policy, amount of premiums, time of expiration, etc., will be sent post-paid on receipt of $1.00. Or we will give one as a premium with each new subscription to the IRON TRADE REVIEW, price $3.00 per year.

Address,

Cleveland Printing and Publishing Co.

Cleveland, Ohio.

Detroit & Cleveland STEAM NAVIGATION CO.

Week Days **FOR DETROIT** 9.00 P. M.

Special Sunday Night and Thursday Morning Trips, July and August.

Four Trips **For Mackinac** per Week,

and Lake Huron Way ports.

All Departures from 23 River Street.

E. B. WHITCOMB, G. P. A. T. F. NEWMAN, G. A

VALLEY RAILWAY.

Depot foot South Water Street

	Arrive.	Depart.
Valley Junction Mail	*7 45 a m	*6 50 p m
Marietta Express	†11 20 a m	†1 30 p m
Valley Junction Express	* 4 16 p m	* 9 55 a m
Akron & Cleve. Accom	* 7 40 p m	*7 45 a m

*Daily.
†Daily, except Sunday.

WM. THORNBURGH, General Manager. R. A. CARRAN, Gen. Pass. Ag't.

THE FAVORITE ERIE RAILWAY AND Picturesque Route TO New York, Boston and the East.

THE SHORTEST AND QUICKEST ROUTE TO PITTSBURGH, WASHINGTON AND BALTIMORE, AND THE SOUTHEAST.

Change of time goes into effect May 20, 1888.

Central, or Ninetieth Meridian time, 33 minutes slower than Cleveland city time.

Until further notice trains will leave from the New Central Depot, South Water Street and Viaduct, as follows:

	Depart.
No. 62, Mahoning Valley Accommo	† 6 40 a m
No. 72, New York Express	* 8 30 a m
No. 72, Fast Pittsburgh Express	* 8 30 a m
No. 64, Fast New York Express	* 3 00 p m
No. 64, Pittsburgh Express	* 3 00 p m
No. 66, Youngstown Accommo	* 5 00 p m
No. 68, Pittsburgh Express	†11 10 p m
No. 68, New York Express	†11 10 p m
No. 70, Pittsburgh Local Express	*11 40 a m
No. 74, Shenango Valley Express	† 4 00 p m
	Arrive.
No. 73, Shenango Valley Express	† 9 25 a m
No. 61, New York Express	† 5 45 a m
No. 61, Pittsburgh Express	† 5 45 a m
No. 65, Fast New York Express	*10 55 a m
No. 65, Pittsburgh Express	*10 55 a m
No. 67, Pittsburgh Express	† 1 20 p m
No. 63, New York Express	* 7 05 p m
No. 69, Pittsburgh Express	* 8 40 p m
No. 77, Youngstown Local	* 7 25 a m
No. 13, Erie Express, carrying express matter only, from all points East and South-east, carries no passengers (except Monday)	† 1 20 p m

* Daily. † Daily, except Sunday.

☞This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City and intermediate points without change. No change to Boston and New England cities.

Baggage checked through to all points East.

Through tickets and information regarding the route can be obtained at office, 141 Superior street, and at Central Depot, South Water street and Viaduct, Cleveland. Ship by Erie Express.

E. B. THOMAS, 2d Vice President, Cleveland, O.
L. P. FARMER, Gen'l Pass. Agent, New York.
W. C. RINEARSON, Ass't G. P. A., Cincinnati, O
M. L. FOUTS, City Passenger Agent, 141 Superior Street, Weddell House, Cleveland, O.

Cleveland & Marietta R. R.

THROUGH LINE BETWEEN

Marietta, Caldwell, Cambridge, Newcomerstown, Canal Dover, Canton, Akron, Cleveland, Buffalo, Toledo, Pittsburgh, New York, Coshocton, Newark, Zanesville, Columbus, Chicago and St. Louis.

In effect October 14, 1888.

GOING NORTH.			GOING SOUTH.	
No. 4.	No. 2.	STATIONS.	No. 1.	No. 3.
9 50 AM	2 00 AM	Parkersburg	2 45 PM	11 45 PM
11 50	6 45	Marietta	10 00 AM	7 03
12 08 PM	7 03	Caywood	9 41	6 43
12 14	7 09	Stanley	9 35	6 38
12 29	7 25	Whipple	9 20	6 23
12 39	7 35	Warner	9 10	6 13
12 53	7 50	Elba	8 56	5 59
1 00	7 57	Macksburg	8 49	5 52
1 07	8 04	Dexter City	8 42	5 45
1 11	8 09	South Olive	8 38	5 40
1 17	8 16	Dudley	8 32	5 33
1 25	8 25	Caldwell	8 25	5 26
1 30	8 35	Belle Valley	8 20	5 16
1 44	8 44	Ava	8 00	5 06
1 56	8 56	Pt. Pleasant	7 47	4 54
2 10	9 08	Byesville	7 33	4 40
2 28	9 27	Cambridge	7 14	4 24
2 35	9 33	Oldham's	7 04	4 14
2 42	9 40	Miller's	6 57	4 07
2 57	9 50	Kimbolton	6 47	3 57
2 57	9 55	Guernsey	6 42	3 52
3 04	10 02	Post Boy	6 35	3 45
3 15	10 13	N. Comerstown	6 25	3 35
3 25	10 20	Wolf's	6 16	3 25
3 36	10 33	Phillipsburg	6 05	3 14
3 41	10 38	Black Band	6 00	3 09
3 47	10 44	Turner's	5 55	3 03
3 57	10 55	Canal Dover	5 45 AM	2 53
4 17	11 17	ar. Vall'y J'n. lv		2 30
		lv. Vall'y J'n. ar		
	12 23 PM	Canton		1 18
	1 18	Akron		12 20
	2 46	Cleveland		11 20 AM
	8 15	Buffalo		5 40
11 15 PM	6 20	Toledo		7 45

Train No. 8 leaves Marietta at 3 00 p. m. Whipple 4 00, Warner 4 15, Elba 4 35, Macksburg 4 45, Dexter City 4 55, Caldwell 5 26, arriving Cambridge 7 00 p. m. Train No. 5 leaves Valley Junction at 4 50 p. m., arriving at Canal Dover 5 15 p. m.

Through coaches on trains Nos. 2 and 3 between Marietta, Canton, Akron, Cleveland, and Toledo. Close connections made at Marietta with C., W. & B., M., C. & N., Z. & O., and Ohio river Packets; at Cambridge with the B. & O. east and west; at Newcomerstown with P., C. & St. L. east and West; at Canal Dover with C., L. & W. and C. & P., north and east; at Valley Junction with W. & L. E. and Valley R'y.

A. T. WICKOFF, Gen. Manager. W. K. RICHARDS, Gen. Pass. Agt.

¼ to 6 in.	11½
¼ to 9-32 and 6½ to 7 in.	12
3-6 in.	14

Flats.

	cts. lb
2 to 9-16 wide by 2 to ⅝ thick	0

Bessemer and O. H. Steel.

	cts. lb.
Machinery base price.	02¾
Tire "	02¾
Spring "	03¼
Sleigh Shoe "	02¾
Toe Calk "	03
Cutter Shoes, tapered and burr	03

For extra sizes, see classification below.

Machinery Steel.

ROUNDS AND SQUARES.

	cts. per lb ex.
1 to 3 in. incl.	base
3½ to 4 "	0.3
4½ to 6 "	1.0
¾ to 15-16 "	0.2
1 to 11-16 "	0.3
⅝ to 7-16 "	0.4
5-16 to 11-32 "	0.5
¼ and 9-32 "	0.7
Machine cutting, specified lengths, ab'e 24 in.	0.2
Machine cutting, specified lengths, 12 to 24 in.	0.4

Machine cutting to specified lengths less than 12 inches, according to contract, but not less than 0.6 cents on each size extra. Sawing, one-half of the above extra for cutting.

FLATS. cts. per lb ex.

1¼ to 6 in., by 5-16 to 1 in. thick	base
1¼ to 6 in., by ¼ and 9-32 in. thick	0.2
1½ to 6 in., by 3-16 and 7-32 in. thick	0.3
1½ to 6 in., by ⅛ and 5-32 in. thick	0.4
¾ to 1 7-16 in., by ¼ to 1 in. thick	0.3
⅜ to 1 7-16 in., by 3-16 and 7-32 in. thick	0.4
⅜ to 1 7-16 in., by ⅛ and 5-32 in. thick	0.5
¾ to 11-16 in., by ¼ to ⅝ in. thick	0.4
¾ to 11-16 in., by 3-16 and 7-32 in. thick	0.6
¾ to 11-16 in., by ⅛ and 5-32 in. thick	0.8
⅝ to ¾ in., by 1-16 and 3-32 in. thick	2.0
13-16 to 1¼ in., by 1.16 and 3-32 in. thick	1.5
1¼ to 3 in., by 1-16 and 3-32 in. thick	1.0

These extras apply on Tire, Toe-Calk, Shoe and Flat Machinery Steel, also on Cutter Shoes.

SPRING STEEL FLATS. cts. ex.

1¼ to 4 in. by No. 4 gauge to ⅛ in. inclusive,	base
1 and 1½ in. by No. 1 gauge to 4 gauge "	0.2
1 to 3 in. by No. 5 gauge to 7 gauge "	0.5
⅞ to 3 in. by No. 8 gauge to 10 gauge "	1.0
¾ to 3 in. by No. 11 gauge to 16 gauge "	2.0
½ to 3 in. by No. 17 gauge to 20 gauge "	3.5
⅝ to ⅝ in. by No. 10 gauge to 16 gauge "	4.0
⅝ to ⅝ in. by No. 17 gauge to 20 gauge "	5.0
⅝ to ⅝ in. by No. 21 gauge to 24 gauge "	6.0

Bessemer and Open Hearth cut to length, 24 nch and over 1-10 cent per lb. extra, and under, y special contract.

ROUND SPRING STEEL. cts. ex

⅝ to 1⅛ inches	base
⅛ to 9-16 inches	0.2
⅝ to 7-16 inches	0.5
5-16 inches	1.0
¼ inches	1-5

English Tool Steel.

Jessops	16c
Hob on's "Best"	16c
" "Choice"	36c

Burden Boiler Rivets.

⅛, ⅜, 11-16 and ¾ inches diameter	4 00
Bridge ⅛, ⅜, 11-16 and ¾ inch diam	4 00

Rolls and Castings.

Furnace floor and straightening plates	1¼c
Housings and castings not otherwise specified	1¾c
Guide plates	2½c
Spindles and coupling boxes	1¾c
Sand rolls and pinions, large size	2 c
Sand rolls and pinions, small size	2½c
Pipe mill castings	3 c
Rolling mill castings under 50 lb	2 c
Spur and bevel wheels, large	3 c
Spur and bevel wheels, small	3½c
Pulleys up to 30 inches	4 c
Pulleys over 30 inches	3½c
Engine castings, light	3¼c
Engine castings, heavy	2¾c

SCRAP IRON AND OLD METAL

	Net Ton.
No. 1 R. R. wrought scrap	$23 00
No. 1 wrought scrap	20 00
No. 1 Machine cast scrap	15 00
Stove plate (free from burnt iron)	10 50
Grate bars	11 00
Pipes and flues (Clean)	13 00
Tank iron	12 50
Hoop and band iron	10 00
Iron axles	28 00
Light sheet iron	10 00
Axle turnings	16 00
Wrought turning (free from cast)	15 00
Wrought iron, oily drillings	14 00
Cast borings	11 00
Malleable iron	10 50
Uncut wrought iron boilers	10 00
Steel boiler plates	14 50
Old iron T rails gross tons	$27 00
Old steel rails	23 00
Car wheels	20 00
Old copper per lb	7
No. 1. H. red Brass	8½
Heavy yellow brass	6½
Light yellow Brass	6
Scrap Zinc	3
Tea Lead	3
Heavy Lead	3¼

WROUGHT IRON PIPE.

DISCOUNTS.

	Discount Per Ct.
Wrought iron pipe: Butt black X str	50
XX str	
Wrought iron pipe. Lap black X str	60
XX str	
Wrought iron pipe: Butt galv	40
" Lap "	50
Lap-welded boiler tubes	50
" drive pipe	
" casing	
Lead pipe per lb	
Sheet lead "	
Galvanized spiral pipe	50
" " fittings	30
Patent adjustable ells	40
Globe ventilators	60
Tin tubing	50
Fittings for same	30
Expanding conductor pipe and fittings	40
Cast iron piece fittings for wrought iron pipe, black and galv	70
Shings and plugs	75

Malleable unions	65
" flange unions	72½
Long screws	70
Gas pipe hooks	50
Cast iron flanges, manifolds and expansion pipe hangers	65
Hook, ring and expansion plates, coil stands	67½
Iron body: Globe, angle, check, cross, safety, butterfly, throttle, back pressure and foot valves	65&10
Iron body: Expansion joints and iron cocks, all iron	65&10
Iron body: Iron cocks with brass plugs	60&10
Straight way valves	
Brass: Globe, angle, check, cross safety, and radiator valves	60&10
Throttle and butterfly valves	50&10
Brass: Fin. globe valves, with finished brass wheels	40&10
Brass: Steam, service, meter and union meter cocks	67½&10
Brass: Expansion joints and steam bibbs	50&10
Mississippi gauge cocks	55
Bingham "	30
Gas proving pumps	50
Oil cups, lubricators and air cocks	60&10
Cocks for steam gauges	60&10
Cylinder cocks	50&10
Comp. gauge cocks	55&10
Water gauges, steam whistles and whistle valves	60&10
Gas fixture fittings	55
McNamara hydrants and street washers	Spec'l
Stop cock boxes	Spec'l
Galvanized wrought iron range boilers, to 52 gallons	65
Galvanized wrought iron range boilers, larger	50
Stands for same	40
Copper bath tubs	25
Closets	Spec'l
Cast iron soil pipe, to 6 in. inclusive	60
" " fittings, to 6 in. inclusive	65
Cast iron sinks	70
" slop sinks	60
Drive-well points	50
Ground key work:	
Rough and fin. plain, tray and bath bibbs	55&10
" " stops, shower stops, hydrant and ball cocks	
Compression:	
Rough and fin. plain, tray and bath bibbs	50&10
" " stops; urinal, hopper, hydrant and ball cocks	50&10
Basin cocks, from No. 1 to 13 inclusive	50&10
" " above No, 13, and double basin	40&10
Shampooing and sink cocks	40&10
Pantry cocks	50&10
Shampooing sprinklers	50&10
Double bath cocks and chain stays	50&10
Hose goods, plain and water back couplings	55&10
Boiler couplings, ground face, per set net, $1.25	10
Boiler couplings plain face, per set net, $1.20	10
Basin plugs and grates; bath, sink and wash tray plugs	60&10
Soldering nipples and unions	65&10
Union joints	60&10
End ferrules; street washer screws, checks and guides	55&10
Hydrant and basin clamps, hydrant sockets	55&10
Pipe taps, reamers and dies	60
Plain pipe tongs and gas plyers	50
Wrenches: Coe	50 & 5
" Girard agricultural	65
" " standard	60 & 5
" Stillson	33⅓
" Armstrong	25 & 5
" Bemis & Call	25 & 5
" Rouse	30
" Bauer's	10
Pipe tongs: Brown's adjustable	50
" Jarecki	50
" Robbins' chain	10
" Brock's	10
Vises: Plain pipe	55
" Smith comb	50
" Parker's comb	50
" Bauer's pipe and bolt	10
Machinists' hammers	40
Copper "	Spec'l
Pipe cutters: Stanwood	20
" Eureka	45
" Saunders	40
" Barnes	50 & 5
Malleable oilers and hand lamps	Spec'l
Screwing stocks	60
Armstrong's adjustable stocks and dies	25&10
Waste, at manufacturer's prices.	
Gas fitters' cement	Spec'l
Hair felt	Spec'l
Riley Bros. cement	Spec'l
Otley Bros. steam packing	Spec'l
Mineral wool	Spec'l
Lubricating compound	Spec'l
Malleable iron fittings, black and galv	25
Wrought iron couplings and nipples, black and galv	70

Standard Wrought Iron, Steam, Gas and Water Pipe.

Nominal Size Inside Diameter.	Price per Foot, Black	Price per Foot, Galvanized.	Thickness.	Nominal Weight per Foot.	No. of Threads per in. of Screw	Price, Extra Threads.
In.			In.	Lbs.		
⅛	0 04	0 05	.068	0 24	27	0 05
¼	0 04	0 05	.088	0 42	18	0 05
⅜	0 04	0 05½	.091	0 56	18	0 05
½	0 05	0 07	.109	0 84	14	0 05
¾	0 07	0 09	.113	1 12	14	0 05
1	0 09½	0 12½	.134	1 67	11½	0 06
1¼	0 12½	0 17	.140	2 24	11½	0 07
1½	0 22	0 25	.145	2 68	11½	0 08
2	0 28	0 32	.154	3 61	11½	0 10
2½	0 44	0 49	.204	5 74	8	0 15
3	0 58	0 64	.217	7 54	8	0 20
3½	0 70	0 86	.226	9 00	8	0 25
4	0 85	1 00	.237	10 66	8	0 35
4½	1 00	1 25	.246	12 49	8	0 45
5	1 20	1 50	.259	14 50	8	0 55
6	1 65	2 00	.280	18 76	8	0 70
7	2 00		.301	23 27	8	0 85
8	2 75		.322	28 18	8	1 00
9	3 70		.344	33 70	8	1 20
10	4 75		.366	40 06	8	1 25
11	5 75		.375	45 02	8	1 50
12	6 50		.375	49 00	8	2 50
13	7 75		.375	54 00	8	
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Price per foot	23 8	23 10	23 12	25	22 15	25	28	31	34 30	38	43 40	45	52 50	60	72 66	86	1 00	1 45	1 85	2 25	3 25	3 55
Price, Lap-Welded Drive Pipe																	90	1 20	1 65	2 20	3 00	4 50

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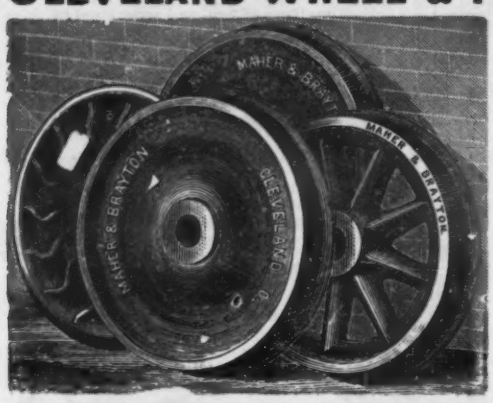

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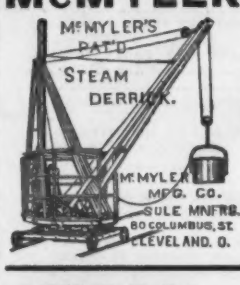

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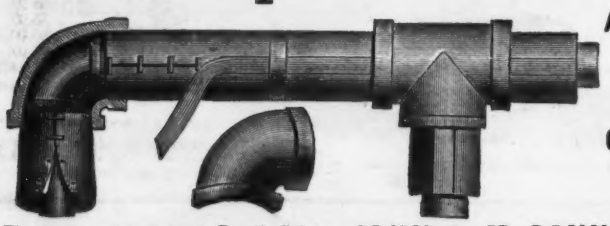

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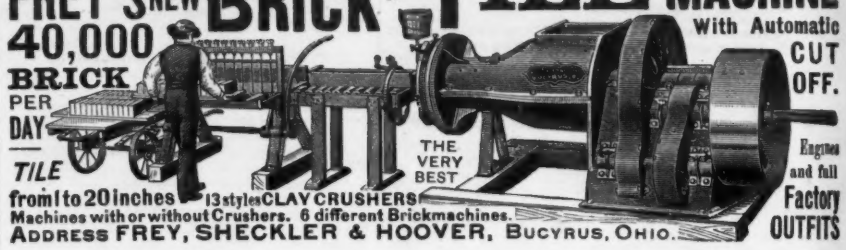

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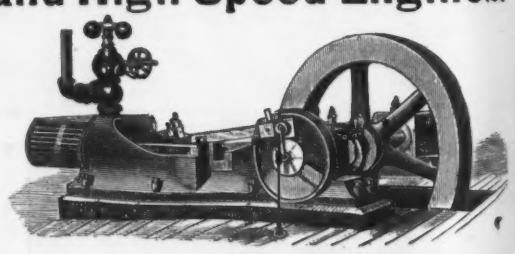

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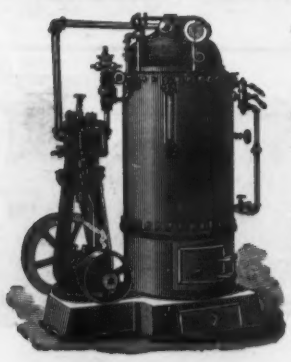

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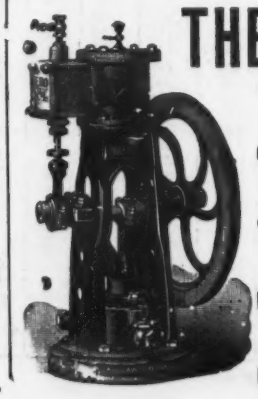

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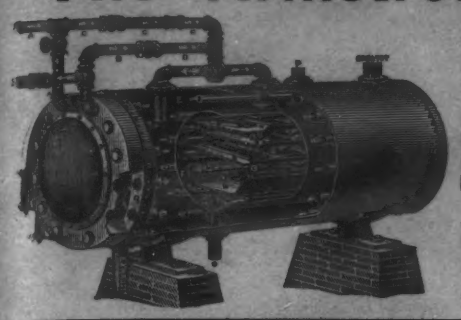

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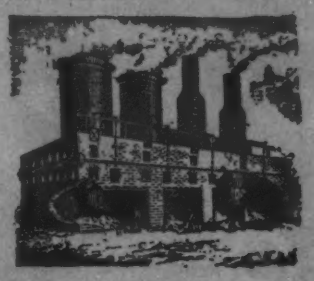

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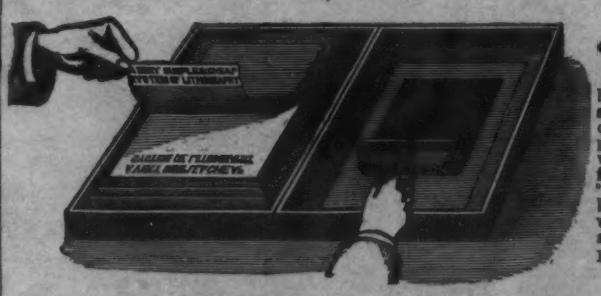

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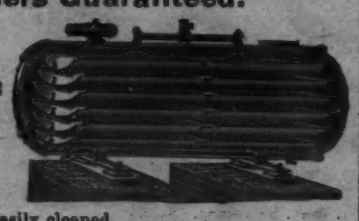

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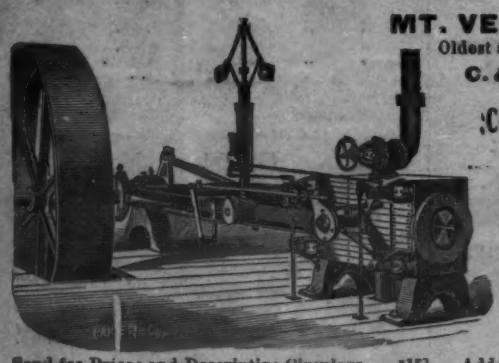

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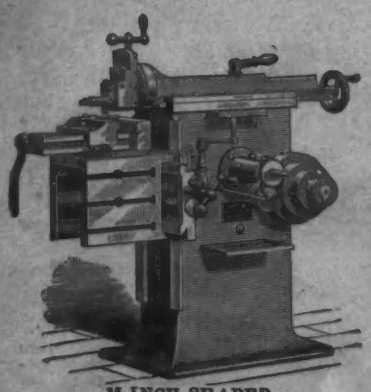

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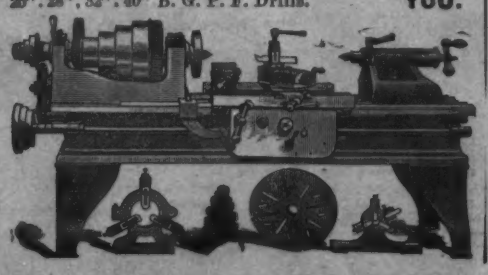

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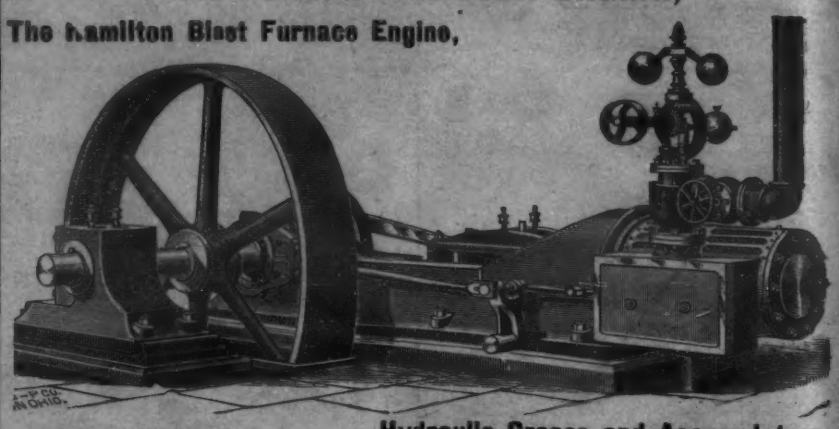

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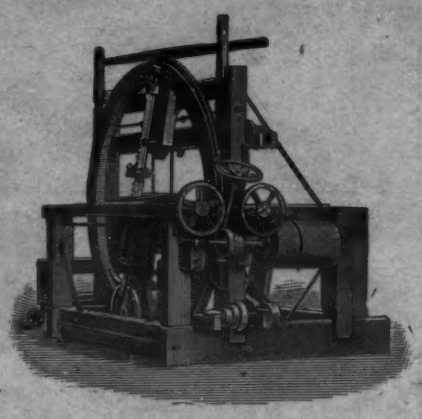

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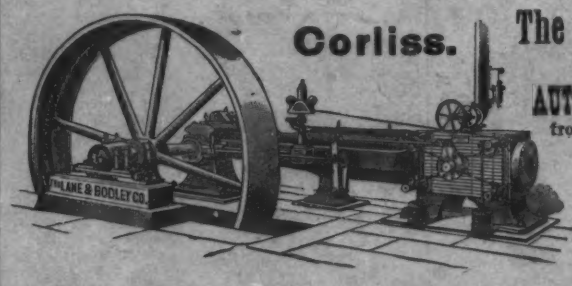

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